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# Draft Environmental Impact Statement Ideal Basic Industries: Cement Plant, Theodore Industrial Park, Alabama and Limestone Quarry, Monroe County, Alabama Appendices, Volume I. Appendix A Projection Description

U.S. Environmental Protection Agency, Atlanta Ga. Region IV

19 May 78

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Ideal Basic Industries proposes to construct a new cement plant in Theodore Industrial Park near Mobile, Alabama and a supporting limestone quarry in Monroe County Near Monroeville, Alabama. This impact statement addresses the existing air quality in Mobile County and Theodore Industrial Park and the natural environment of the proposed quarry sites. Air emissions at the proposed plant site are modeled and their impacts are projected for the area. The impact of constructing an access road across wetlands are discussed. Mitigative measures to reduce these impacts are presented as well as alternative locations.

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# DRAFT
# ENVIRONMENTAL IMPACT STATEMENT
# IDEAL BASIC INDUSTRIES

CEMENT PLANT
THEODORE INDUSTRIAL PARK, ALABAMA

LIMESTONE QUARRY
MONROE COUNTY, ALABAMA

## APPENDICES
## VOLUME I

## APPENDIX A PROJECT DESCRIPTION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IV

REPRODUCED BY
NATIONAL TECHNICAL
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SPRINGFIELD, VA. 22161

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## NOTE ON THE USE OF THE METRIC SYSTEM:

The numbers contained in this volume and in all of the following appendices are expressed in metric units, with the English units in parentheses.

# APPENDIX A. PROJECT DESCRIPTION

## GENERAL OVERVIEW

Ideal Cement Division of Ideal Basic Industries of Denver, Colorado, plans to construct and operate a 1.4 million-metric-ton-per-year (1.5 million ton-per-year) portland cement plant and a limestone quarry near Mobile and Monroeville, Alabama, respectively. The cement plant will be located in the Theodore Industrial Park along the federally authorized Theodore Ship Channel. The construction costs will be $165 million (1977 dollars) over approximately a 30-month period. The cement plant, which will start operations in late 1980 or early 1981, is expected to have a 50-year life and a staff of approximately 135 employees.

The quarry will produce about 2.4 million metric tons (2.7 million tons) per year (wet basis) of limestone for shipment via barge to the cement plant. The development of the quarry facilities will take 18 months and will cost more than $12 million (1977 dollars). The quarry, which would start operating in mid-1980, will have 19 employees.

A portland cement plant produces various types of cement for use in transportation, pollution control, sewage treatment and water supply, commercial, residential, and industrial construction. The process requires that the raw materials (limestone, sand, clay, and iron ore) be ground and mixed in specific proportions; fed into a rotating furnace to be fused into small balls called clinker; mixed and ground with gypsum to form cement (see Figure A.1). The end product is a fine powder which remains loose for bulk shipment or is packed into bags. Approximately 60 percent of the finished cement from the proposed plant is to be bulk loaded onto barges and oceangoing vessels for shipment to the Ideal Basic Industries facilities in Louisiana and Florida. The cement plant will depend heavily on water transportation, since the large volume-to-weight ratio of the raw materials and cement makes other transportation very costly. Therefore, a major requirement of the project will be

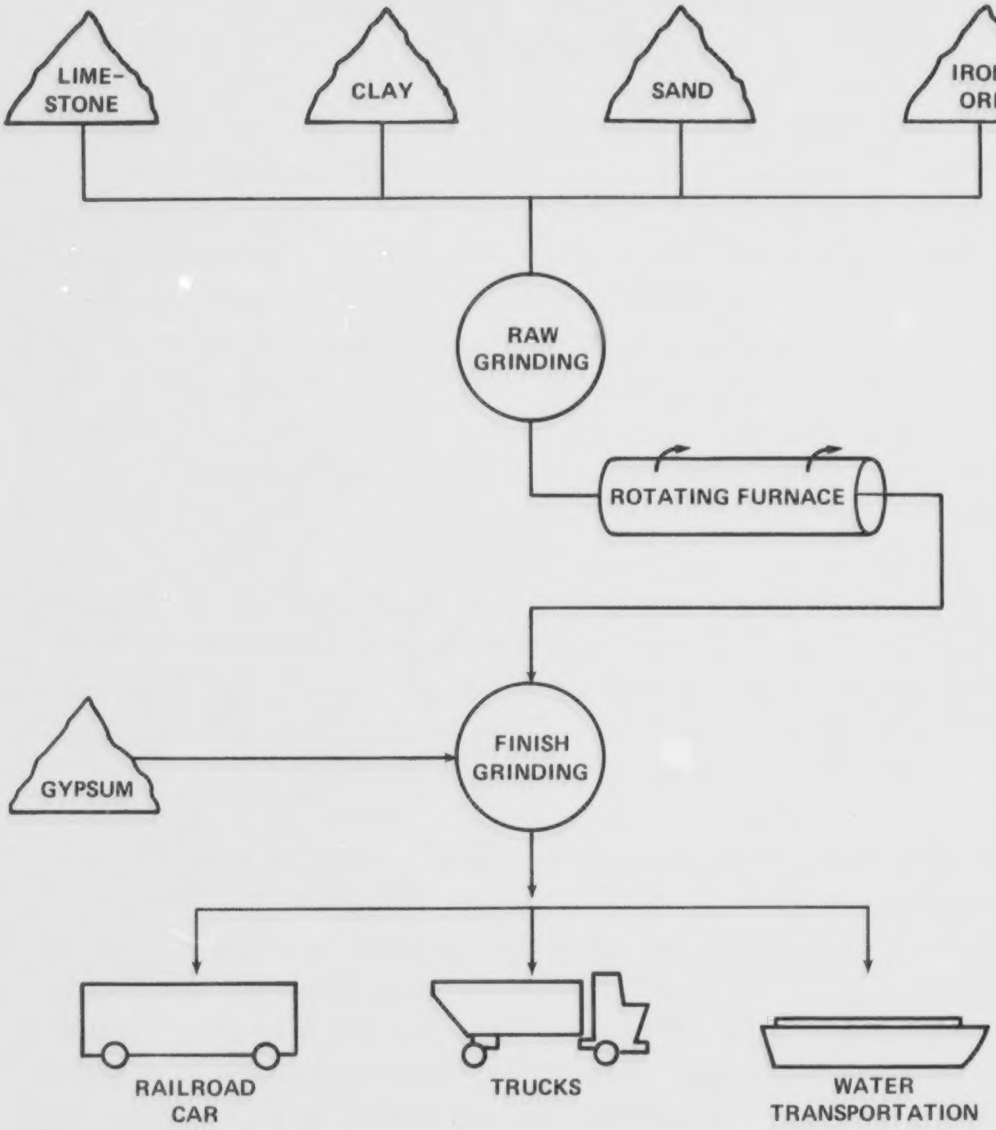
LIME-
STONE
CLAY
SAND
IRON
ORE
RAW
GRINDING
ROTATING FURNACE
GYPSUM
FINISH
GRINDING
RAILROAD
CAR
TRUCKS
WATER
TRANSPORTATION

Figure A.1
TYPICAL PORTLAND CEMENT PROCESS

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED CEMENT MANUFACTURING**
**PLANT THEODORE INDUSTRIAL PARK**
**MOBILE, ALABAMA**

adequate water transportation facilities and access to the Alabama River and Mobile Bay.

The cement plant will be supplied with raw materials from various sources. The limestone will be quarried from a 1,633-hectare (4,035-acre) tract located on the east bank of the Alabama River in Monroe County. Ideal Basic Industries owns 739 hectares (1,826 acres) and has mineral rights to the remaining 894 hectares (2,209 acres).

The clay and silica sand will be mined at the Ideal Basic Industries existing quarry at 24-Mile Bend near Axis on the Alabama River. Approximately 195,000 metric tons (215,000 tons) of clay and 98,000 metric tons (108,000 tons) of sand are needed to meet annual cement production requirements. The other essential raw materials--iron ore [20,400 metric tons (22,500 tons)], gypsum [61,000 metric tons (67,300 tons)], and coal [259,000 metric tons (285,000 tons)]--will be obtained through outside sources.

The proposed project will affect local air quality and noise levels and will involve wastewater discharges and solid waste disposal. However, the project is being designed to minimize adverse impacts and to comply with the environmental requirements of local, state, and federal agencies. This appendix describes the environmental and socioeconomic aspects of the proposed project (both the cement manufacturing plant and the quarry facility). The impacts, possible mitigating actions, and the alternatives are discussed in the following appendices.

The information contained in this appendix and used in addressing the other aspects of an environmental impact statement reflects the latest plans and best estimates of Ideal Basic Industries. Where information is uncertain, the worst case is described to provide a conservative assessment of the project's environmental effects. Final design changes may occur; however, no future alterations will be incorporated in the project unless they involve either improvement or no significant change in environmental quality.

# PLANT SITE

## SITE LOCATION AND DEVELOPMENT

### EXISTING CONDITIONS

The proposed cement plant site is located in south Mobile County just beyond the southern edge of the city limits of Mobile, Alabama (see Figure A.2). The 70.8-hectare (175-acre) site is within the Theodore Industrial Park, a 1,800-hectare (4,400-acre) area. Completion of the federally-authorized Theodore Ship Channel will provide deep water access for industries within the park (see Figure A.3).

The northern boundary of the Ideal Basic Industries site is established by the Alabama State Docks Terminal Railway Corridor. Dauphin Island Parkway forms the eastern boundary. The property lies along the existing 3.7-meter (12-foot) deep by 90-meter (300-foot) wide barge canal on the southern end and is adjacent to the Airco Alloys and Carbide, Inc. plant along its western border.

Figures A.4 and A.5, recent aerial photographs of the site, show that the property is relatively flat except in the vicinity of the barge canal. The ground elevations range from just above sea level along the marsh adjacent to the North Fork Deer River to more than 6 meters (20 feet) above mean sea level (msl) along the canal. There are remnant longleaf pine trees on the site, except in the wetland area adjacent to the North Fork Deer River. Because most of the site has been cleared periodically by fire or hardwood lumbering, there is a well-developed understory of hardwoods and a prevalence of weedy plants in open areas.

The area surrounding the industrial park is predominantly rural, with the population concentrated in Mobile, Theodore, Grand Bay, and Bayou La Batre. Most of the land to the south is undeveloped, with only minimal acreage devoted to residential use and small-scale farming. Residential

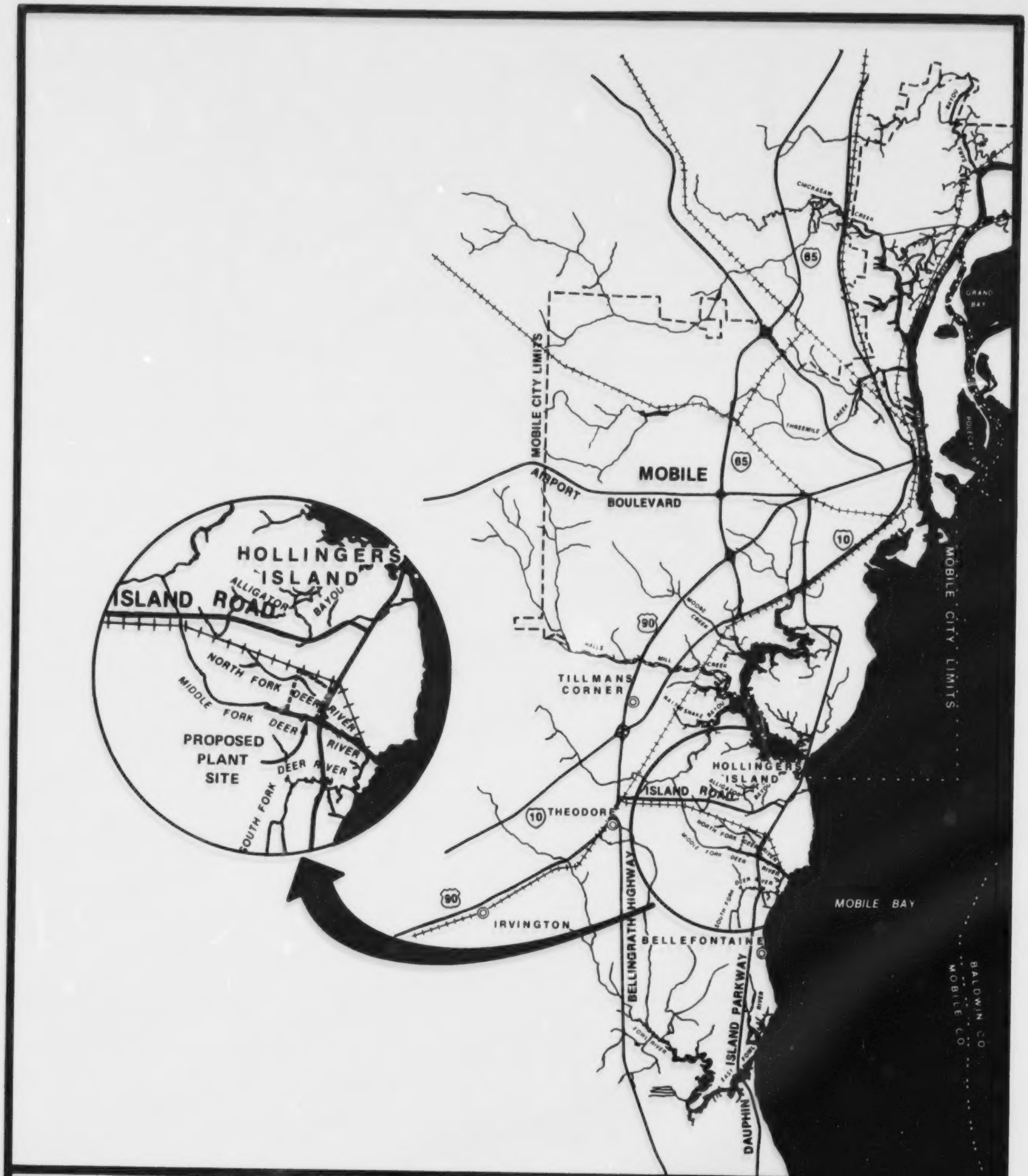
HOLLINGERS ISLAND
ISLAND ROAD
ALLIGATOR BAYOU
NORTH FORK DEER RIVER
MIDDLE FORK DEER RIVER
PROPOSED PLANT SITE
DEER RIVER
SOUTH FORK
CHICKASAW CREEK
65
GRAND BAY
MOBILE CITY LIMITS
THREEMILE CREEK
POLECAT BAY
MOBILE
AIRPORT BOULEVARD
10
90
MOORE CREEK
HALLS MILL CREEK
TILLMANS CORNER
RATTLESNAKE BAYOU
THEODORE
IRVINGTON
BELLINGRATH HIGHWAY
BELLEFONTAINE
MOBILE BAY
ISLAND PARKWAY
DAUPHIN
FOWL RIVER
EAST FOWL RIVER
BALDWIN CO
MOBILE CO
0 1 2
SCALE IN KILOMETERS

Figure A.2
THE PROPOSED PLANT SITE RELATIVE TO MOBILE, ALABAMA

SOURCE: USGS, 1974.

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AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED CEMENT MANUFACTURING**
**PLANT THEODORE INDUSTRIAL PARK**
**MOBILE, ALABAMA**

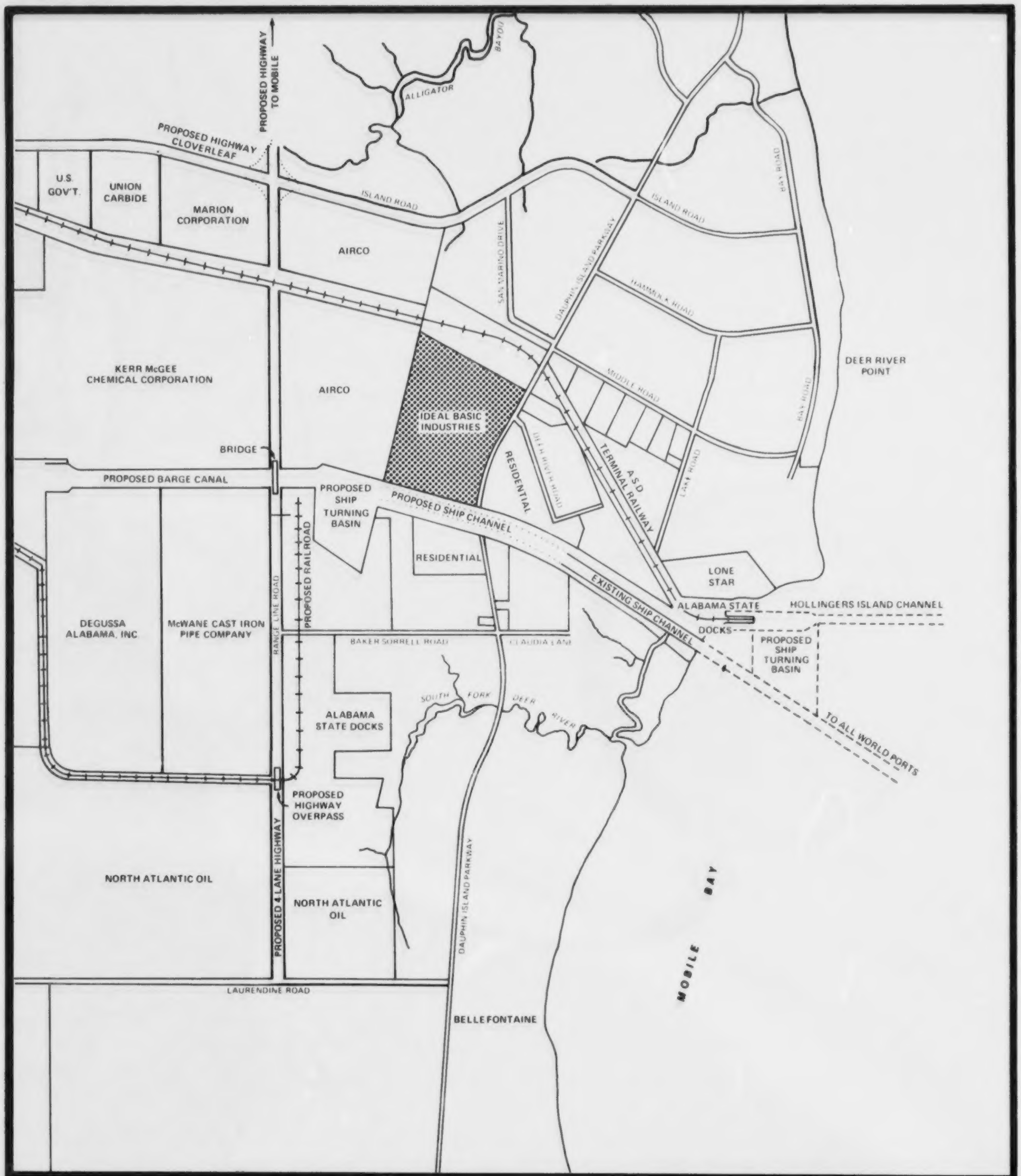
PROPOSED HIGHWAY TO MOBILE
ALLIGATOR
BAYOU
PROPOSED HIGHWAY CLOVERLEAF
U.S. GOV'T.
UNION CARBIDE
MARION CORPORATION
ISLAND ROAD
AIRCO
SAN MARINO DRIVE
DAUPHIN ISLAND PARKWAY
ISLAND ROAD
BAY ROAD
HAMMACK ROAD
KERR McGEE CHEMICAL CORPORATION
AIRCO
IDEAL BASIC INDUSTRIES
MOBILE ROAD
DEER RIVER POINT
BAY ROAD
BRIDGE
DEER RIVER ROAD
RESIDENTIAL
ASD TERMINAL RAILWAY
LAKE ROAD
PROPOSED BARGE CANAL
PROPOSED SHIP TURNING BASIN
PROPOSED SHIP CHANNEL
PROPOSED RAILROAD
RESIDENTIAL
LONE STAR
ALABAMA STATE DOCKS
HOLLINGERS ISLAND CHANNEL
EXISTING SHIP CHANNEL
PROPOSED SHIP TURNING BASIN
DEGUSSA ALABAMA, INC
McWANE CAST IRON PIPE COMPANY
RANGE LINE ROAD
BAKER SORRELL ROAD
CLAUDIA LANE
SOUTH FORK DEER RIVER
TO ALL WORLD PORTS
ALABAMA STATE DOCKS
PROPOSED HIGHWAY OVERPASS
NORTH ATLANTIC OIL
PROPOSED 4 LANE HIGHWAY
NORTH ATLANTIC OIL
DAUPHIN ISLAND PARKWAY
MOBILE BAY
LAURENDINE ROAD
BELLEFONTAINE

**Figure A.3**
**THE THEODORE INDUSTRIAL PARK SITE**
**(Adapted from Mobile Area Chamber of Commerce, 1976)**

0 1000
SCALE IN METERS

**SOURCE: Environmental Science and Engineering, Inc., 1978.**

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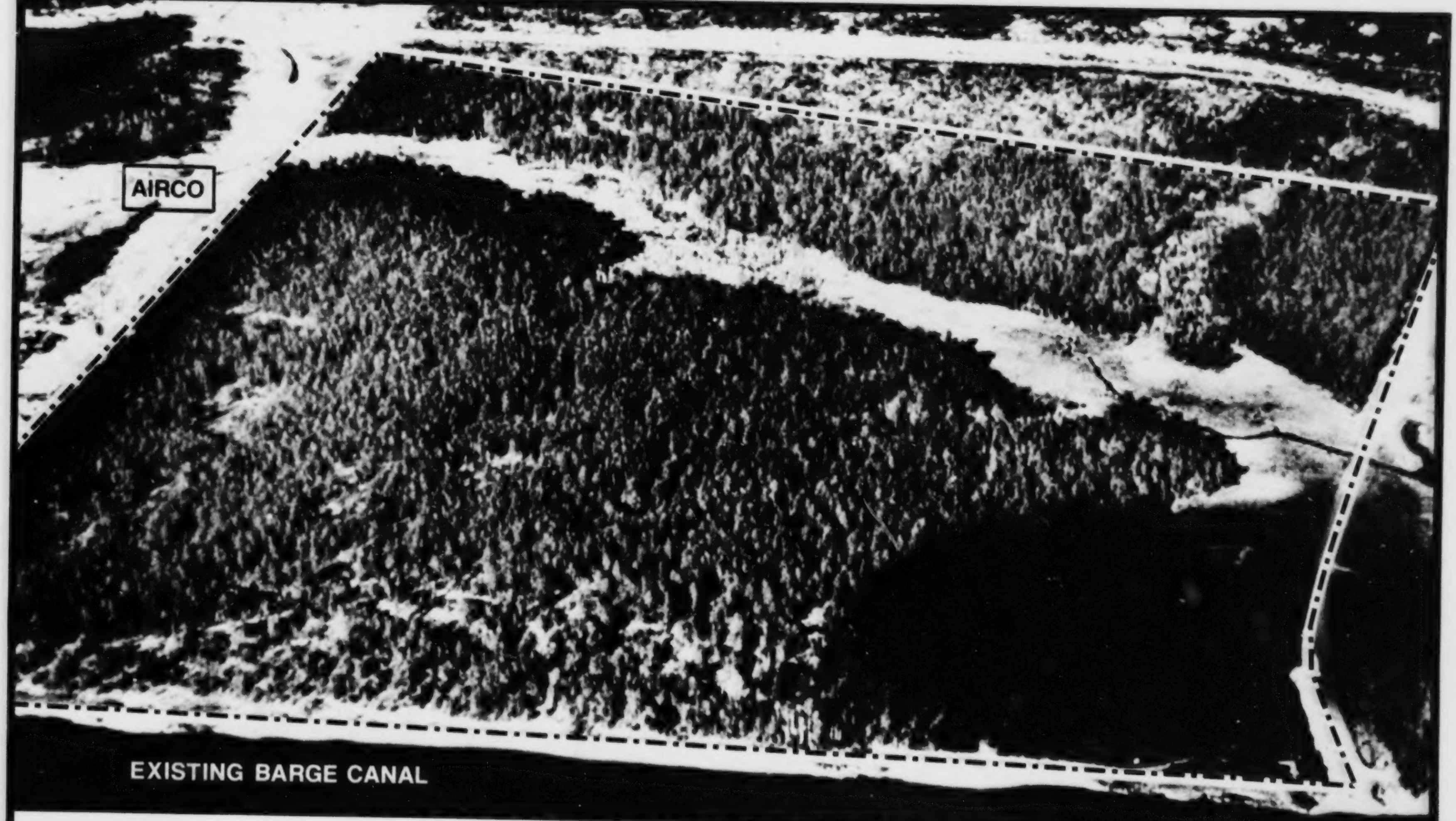

Figure A.4
PLANT SITE – FACING NORTH

-·—·- IDEAL PROPERTY LINE

SOURCE: Ideal Basic Industries, 1977.

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**PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA**

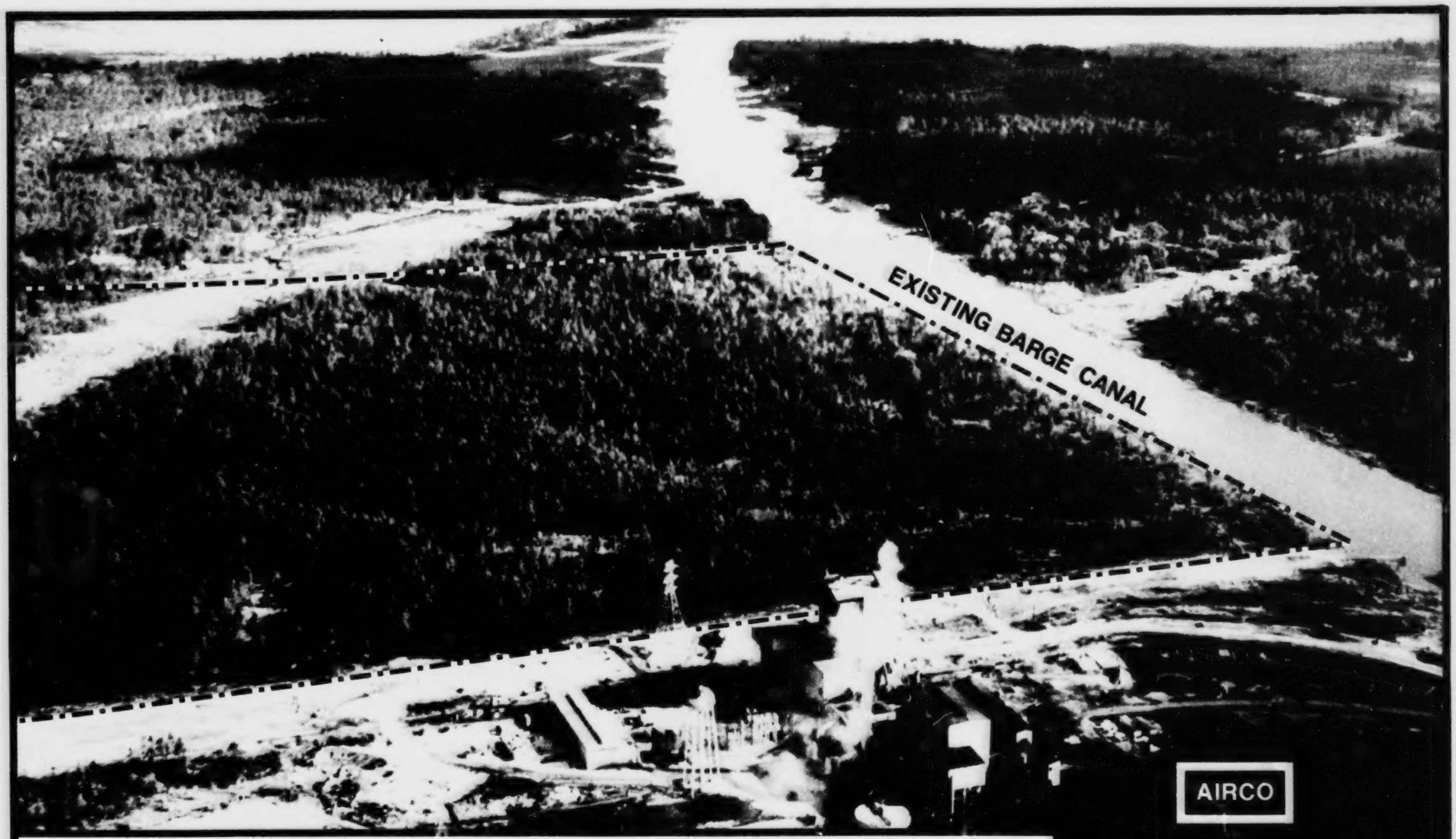

Figure A.5
PLANT SITE – FACING EAST

-·—·- IDEAL PROPERTY LINE

SOURCE: Ideal Basic Industries, 1977.

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STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED CEMENT MANUFACTURING**
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areas are developing to the north and northeast, particularly along the southern banks of Alligator Bayou and along Bay Road from Island Road (Hamilton Boulevard) to Middle Road.

## PLANT SITE DEVELOPMENT

The layout of the proposed Theodore plant area, which constitutes approximately 34.4 hectares (85 acres) of the 70.8-hectare (175-acre) property, is shown in Figure A.6. The principal ecological features of the property, the North Fork Deer River and the associated wetlands, will not be physically disturbed except for the access road and railroad trestle on the extreme western property boundary. It is not planned to develop the 36.4-hectare (90-acre) area north of the wetlands. Along the eastern boundary, a 90-meter (300-foot) wide "greenbelt" zone of existing trees and vegetation will help preserve the scenic value of the area.

These boundaries, together with the proposed ship channel, will form a natural buffer zone from the nearby residential communities. Figure A.7, which presents the U.S. Army Corps of Engineers proposed right-of-way lines for their channel expansion project, shows that many of the existing residential properties along the present canal are within these taking lines. Therefore, there will be a reduction in the number of residences surrounding the Ideal Basic Industries property. Additionally, as described in the Socioeconomics section of Appendix B, Baseline, the land use in the area surrounding the plant will change as the area becomes more valuable as industrial property.

A docking facility along the southern boundary will service water transportation of raw materials and fuels to the plant site and bulk cement from the site. Depending on their draft and size, several vessels could be berthed at the same time. The facility's depth of water below msl will vary depending on draft requirements; however, a conservative depth of 12 meters (40 feet) below msl, the same depth as the federal channel expansion project, has been projected to estimate the maximum amount of

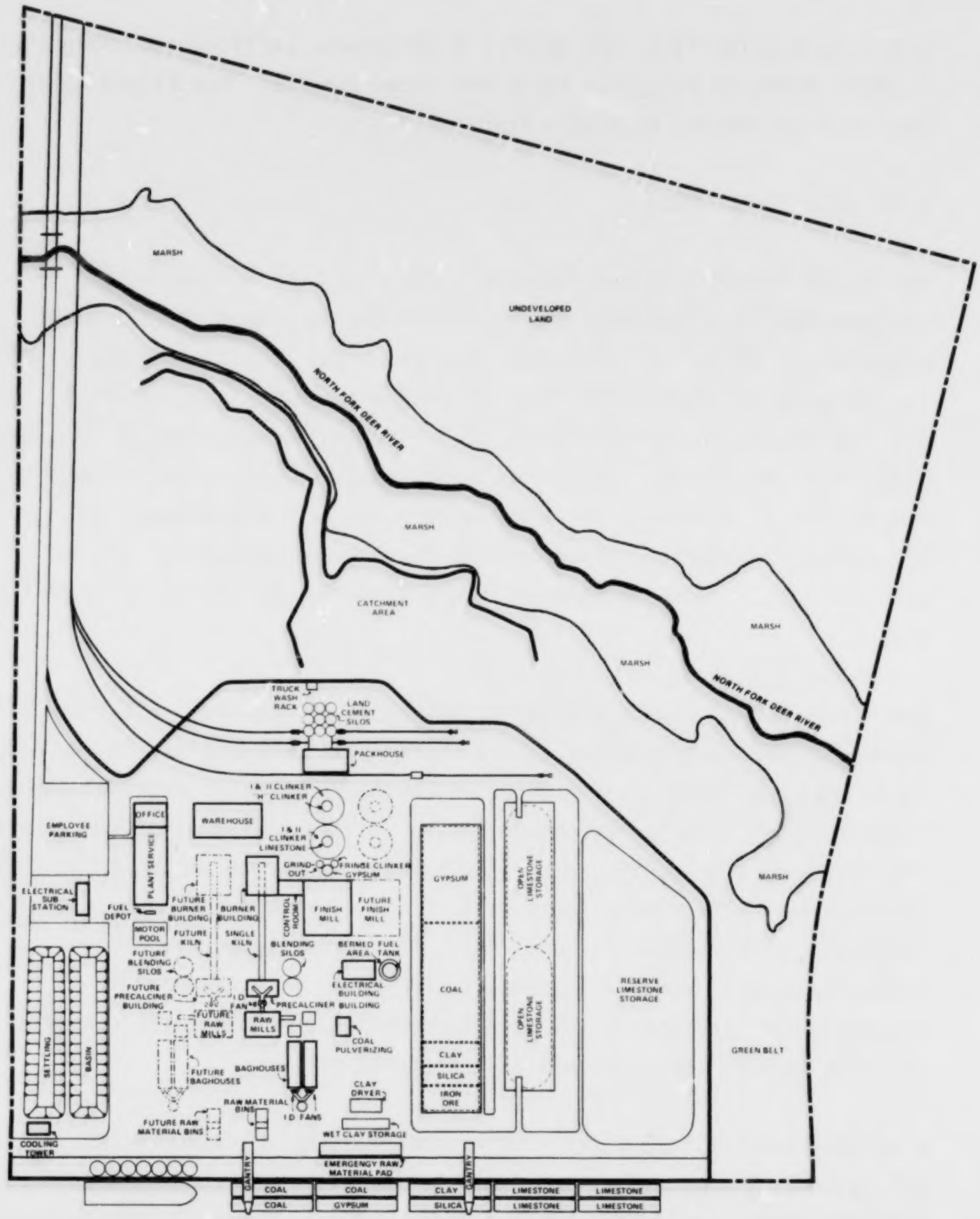
MARSH
UNDEVELOPED LAND
NORTH FORK DEER RIVER
MARSH
CATCHMENT AREA
MARSH
MARSH
NORTH FORK DEER RIVER
MARSH
TRUCK WASH RACK
LAND CEMENT SILOS
PACKHOUSE
I & II CLINKER
H CLINKER
I & II CLINKER
LIMESTONE
GRIND-OUT
FRINGE CLINKER
GYPSUM
EMPLOYEE PARKING
OFFICE
PLANT SERVICE
WAREHOUSE
ELECTRICAL SUB STATION
FUEL DEPOT
MOTOR POOL
FUTURE BURNER BUILDING
BURNER BUILDING
CONTROL ROOM
FINISH MILL
FUTURE FINISH MILL
FUTURE KILN
SINGLE KILN
FUTURE BLENDING SILOS
BLENDING SILOS
BERMED AREA
FUEL TANK
ELECTRICAL BUILDING
FUTURE PRECALCINER BUILDING
I D FAN
PRECALCINER BUILDING
FUTURE RAW MILLS
RAW MILLS
COAL PULVERIZING
SETTLING
BASIN
FUTURE BAGHOUSES
BAGHOUSES
CLAY DRYER
RAW MATERIAL BINS
I D FANS
FUTURE RAW MATERIAL BINS
WET CLAY STORAGE
COOLING TOWER
EMERGENGY RAW MATERIAL PAD
GANTRY
GANTRY
GYPSUM
COAL
CLAY
SILICA
IRON ORE
OPEN LIMESTONE STORAGE
OPEN LIMESTONE STORAGE
RESERVE LIMESTONE STORAGE
GREEN BELT
COAL
COAL
COAL
GYPSUM
CLAY
SILICA
LIMESTONE
LIMESTONE
LIMESTONE
LIMESTONE

Figure A.6
**PROPOSED PLANT PLOT PLAN**

0 100
**SCALE IN METERS**

N

**SOURCE: Ideal Basic Industries, 1977.**

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U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED CEMENT MANUFACTURING**
**PLANT THEODORE INDUSTRIAL PARK**
**MOBILE, ALABAMA**

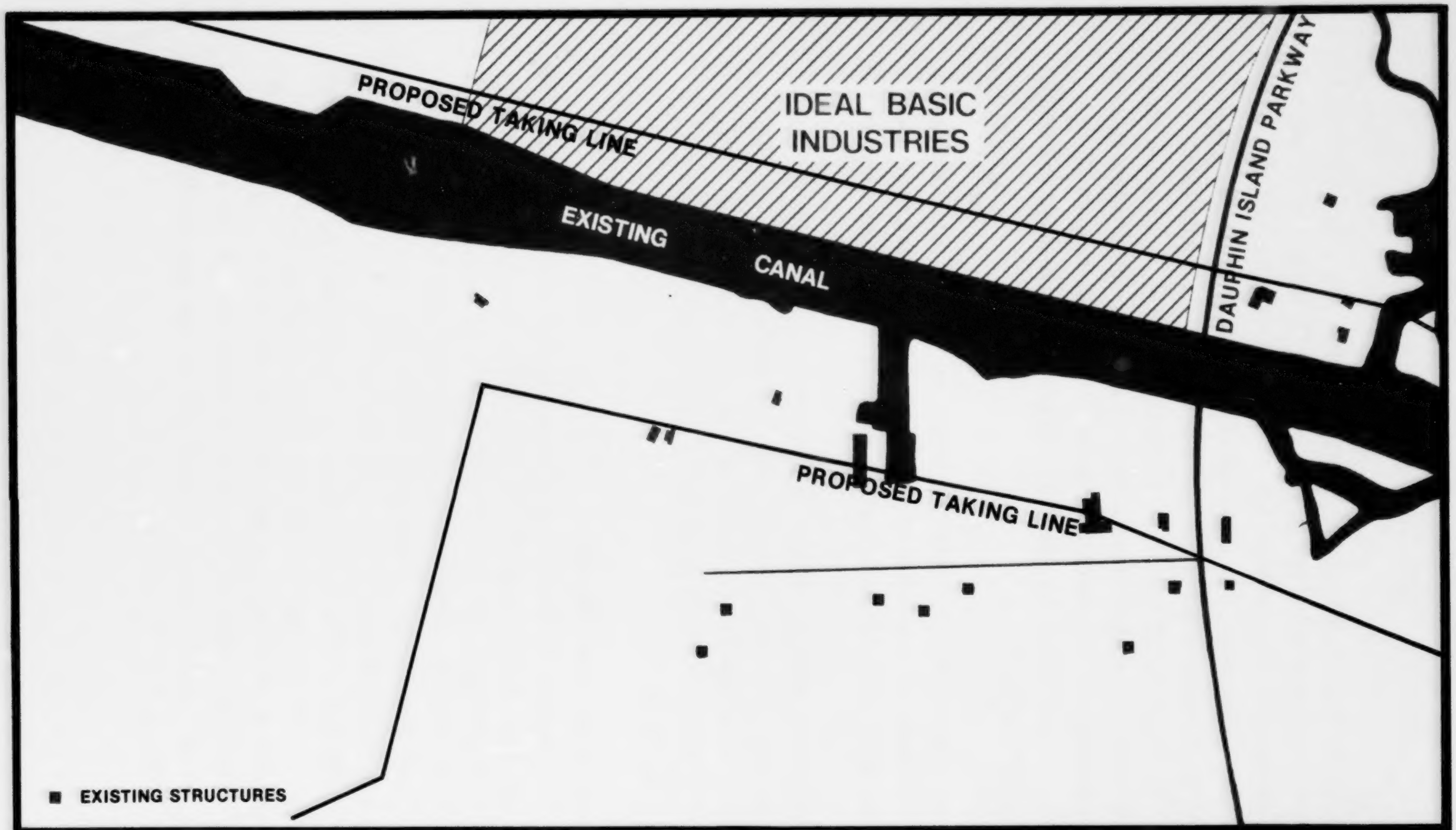
PROPOSED TAKING LINE
IDEAL BASIC INDUSTRIES
DAUPHIN ISLAND PARKWAY
EXISTING CANAL
PROPOSED TAKING LINE
■ EXISTING STRUCTURES

Figure A.7
PLANT SITE AND PROPOSED RIGHT OF WAY FOR CHANNEL EXTENSION

0
100
SCALE IN METERS
N

SOURCE: USGS, 1974.
Rowe Surveying and Engineering Company, Inc., 1977.

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STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

material to be dredged during plant construction. The pierhead line for the dock will be determined by an approximately 60-meter (200-foot) horizontal offset from the northern toe of the ship channel bottom. Using both of these dimensions, the quantity of dredged material has been estimated to be approximately 500,000 cubic meters (650,000 cubic yards). The majority of the plant's dredged material is expected to be stable material since it is from a land cut. It is anticipated that the dredged material will be deposited in one of the U.S. Army Corps of Engineers disposal areas for the spoil from the ship channel and barge canal extension project.

The marine terminal will include two breasting dolphins with a concrete wharf. The wharf will be constructed to the grade elevation of the plant site which will be approximately 4.6 meters (15 feet) above msl.

Another important physical aspect of the proposed plant site is the arrangement of the various storage piles for raw materials and coal. Basically all the raw materials, except the limestone and wet clay, will be stored in a covered area approximately 260 meters by 52 meters (840 feet by 170 feet).

The storage areas shown include:

1. A 230-meter by 52-meter (760-ft x 170-ft) open storage area to accommodate 20-meter (65-ft) high piles of 110,000 metric tons (120,000 tons) of crushed limestone;
2. A 39-meter by 20-meter (129-ft x 67-ft) open storage area for 4,200 metric tons (4,600 tons) of wet clay in a 11-meter (36-ft) high pile;
3. A 260-meter by 52-meter (840-ft x 170-ft) covered storage area for 27,000 metric tons (30,000 tons) of gypsum (wet basis), 45,000 metric tons (50,000 tons) of coal (wet basis), 3,300 metric tons (3,600 tons) of dried clay, 4,200 metric tons (4,600 tons) of wet sand, and 4,200 metric tons (4,600 tons) of iron ore (wet basis).

It is also anticipated that alongside the limestone storage area there will be a dead-storage pile of 494,000 metric tons (545,000 tons) of wet limestone; this pile should be approximately 24,200 square meters (260,200 square feet) in area and approximately 20 meters (65 feet) high. The stormwater runoff from the uncovered storage areas will be drained to a settling basin for clarification before being discharged to the ship channel. The approximate capacity of the basins will be 16 million liters (4.2 million gallons).

Another physical aspect of the plant will be the various buildings and process equipment that will be clustered in the center of the southern portion of the property. These major structures will include: an office and maintenance building and seventeen 60-meter (200-foot) high finish cement silos (nine for land transport and eight for marine transport). In addition, depending on the final design, there will be one or two raw mills, suspension kiln preheaters [which will be 76 meters (250 feet) high], kilns, "clinker" silos, finish mills, and two 90-meter (300-feet) high exhaust stacks.

It is anticipated that the cement plant will have a 380-cubic-meter (100,000-gallon) aboveground fuel oil tank, a 38-cubic-meter (10,000-gallon) underground diesel oil tank, and a 3.8-cubic-meter (1,000-gallon) underground gasoline tank. The fuel oil tank will store fuel to be used for kiln start-up, as a pilot flame for the coal burners, and an auxiliary fuel supply. The diesel and gasoline tanks will be used for fueling plant vehicles and equipment.

The facility plot plan shows a parking lot for employees and a 7.3-meter (24-foot) wide access roadway and railroad spur line extending to the north from the developed portion of the site. The total width of the roadway and railroad corridor, which is located along the western property line, should be about 47.2 meters (155 feet). The access corridor will follow the western boundary of the Ideal Basic Industries property to its intersection with the right-of-way of the Alabama State Docks Terminal Railway. The railroad spur from the cement plant will join with this railway; the access road will continue straight and meet Island Road (Hamilton Blvd.) as shown in Figure A.8.

Another physical feature of the plant design is that the site will be graded so that storm water will drain to the north into an approximately 2-hectare (5-acre) catchment area. This area, which will be formed during construction by grading and berming the low side of the area, will contain the first flush from a rainstorm and will reduce the suspended particulate loading of the runoff prior to discharging it into the freshwater marsh.

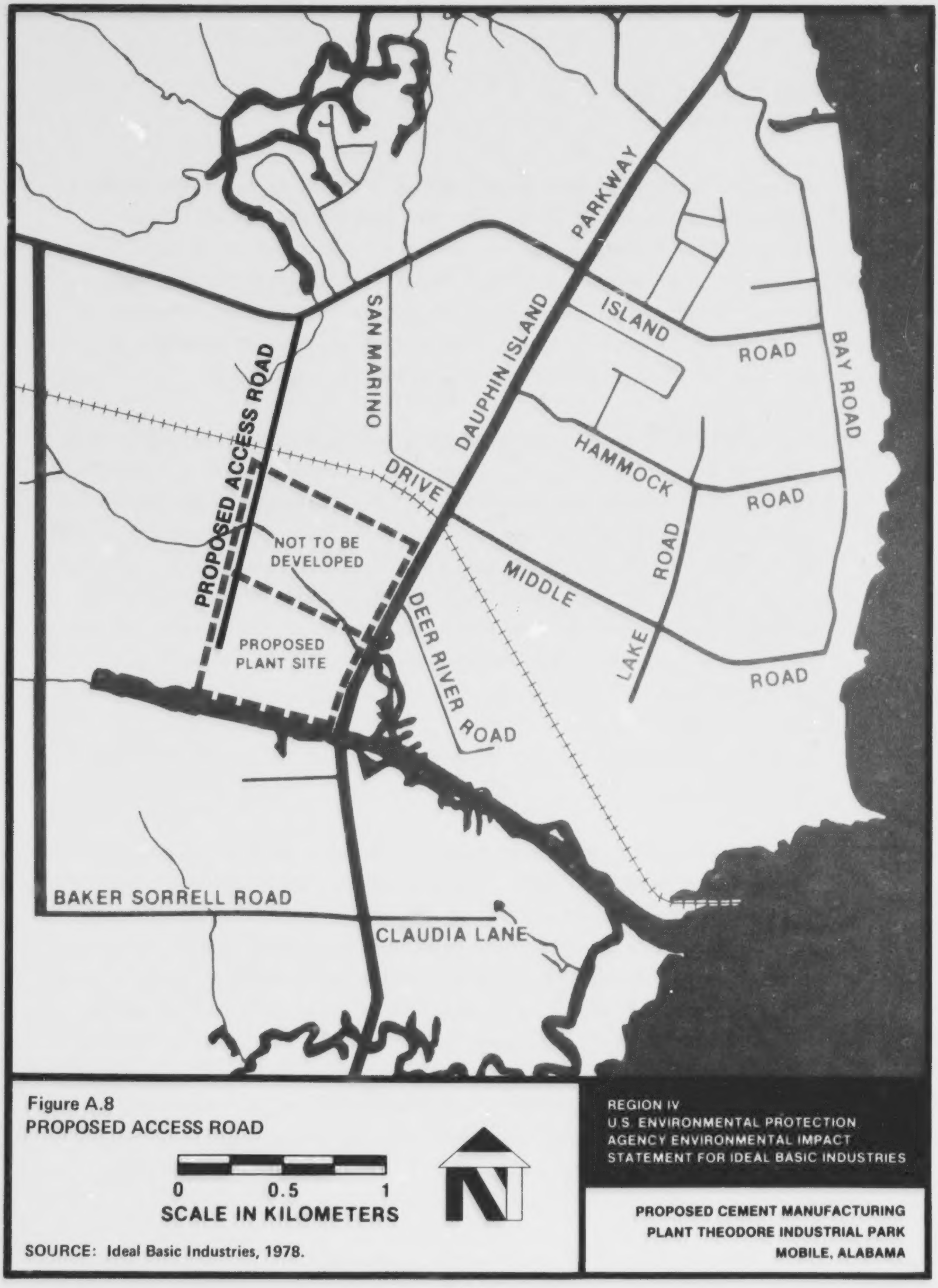
PARKWAY
DAUPHIN ISLAND
ISLAND
ROAD
BAY ROAD
SAN MARINO
DRIVE
PROPOSED ACCESS ROAD
HAMMOCK
ROAD
NOT TO BE DEVELOPED
MIDDLE
ROAD
LAKE
ROAD
PROPOSED PLANT SITE
DEER RIVER ROAD
BAKER SORRELL ROAD
CLAUDIA LANE
0
0.5
1
SCALE IN KILOMETERS
N

**Figure A.8**
**PROPOSED ACCESS ROAD**

SOURCE: Ideal Basic Industries, 1978.

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## PLANT CONSTRUCTION

### INTRODUCTION

Construction of the cement manufacturing facility is scheduled to start in the third quarter of 1978. The construction project will last approximately 30 months and will employ a labor force averaging 360 workers per month. The total construction payroll for the Theodore project will be approximately $15,000,000 in 1977 dollars. Another stimulus to the metropolitan Mobile economy will result from the local purchase of roughly $10,000,000 in construction materials.

Approximately 80 to 85 percent of construction workers involved in the Theodore project will be local hires, i.e., workers who live in Mobile, Baldwin, Washington, and Escambia counties, Alabama, and who commute to the site on a daily basis. This estimate is based on the experience of Brown and Root, Incorporated, the design and construction engineers for the project. The current construction of the Bladex Plant for Shell Chemical Corporation involves a peak employment of 750 workers; 80 percent of these workers come from the counties mentioned above. In addition, Brown and Root, Inc. was involved in the initial construction and 12 subsequent expansions of the Ciba-Geigy chemical complex in McIntosh, Alabama, during which approximately 85 percent of the workers were local.

The capital cost of the cement plant at Theodore will be approximately $165 million in 1977 dollars. The project will be financed through the sale of Industrial Revenue Bonds by the Mobile Industrial Development Board. The facility will be leased rather than owned by Ideal Basic Industries for at least the duration of the bond repayment period, with lease payments set at a level sufficient to cover debt service on the bonds. This financing arrangement, authorized by the Wallace-Cater Act as a means of encouraging industrial development in Alabama, involves substantial savings in interest and taxes relative to conventional financing. Interest costs are relatively low because Industrial Revenue Bonds are municipals and thus their yields are exempt from federal taxation. Direct tax savings result from the fact that public ownership of the facility exempts it from sales taxes for construction materials, as well as from state and local ad valorem taxation.

## CONSTRUCTION ACTIVITIES

The phases and the schedule for construction of the facility are described in the following sections.

### Land Clearing and Grading

About 20 hectares (50 acres) of the 34 hectares (85 acres) of the plant site area will be cleared. The remaining 36 hectares (90 acres) of the property will not be developed. The access road and facility site will be clear-cut of the existing longleaf pine and other vegetation, and the woody debris will be disposed by a combination of chipping and mulching, burning in an air-blower type pit burner, and landfilling at the Irvington Landfill (see the Solid Wastes section of this document for more detailed information). Since the area was logged in 1974, there will be a minimal number of large trees to be cleared, and the operation is expected to take approximately three months (see Figure A.9). It is anticipated that about 130,000 cubic meters (170,000 cubic yards) of earth will have to be moved during the grading period. This material will be utilized for the bermed stormwater catchment area, roadway embankments, site grading, and other tasks. The final grade of plant drainage will be northward towards the freshwater marsh and is designed to balance the cut and fill aspects so that there will not be any excess excavation material.

A concrete sheet pile wall will be constructed along the eastern and northeastern boundary of the facility development. Approximately 17,100 cubic meters (22,375 cubic yards) of fill will be required at the northeastern corner of the plant area.

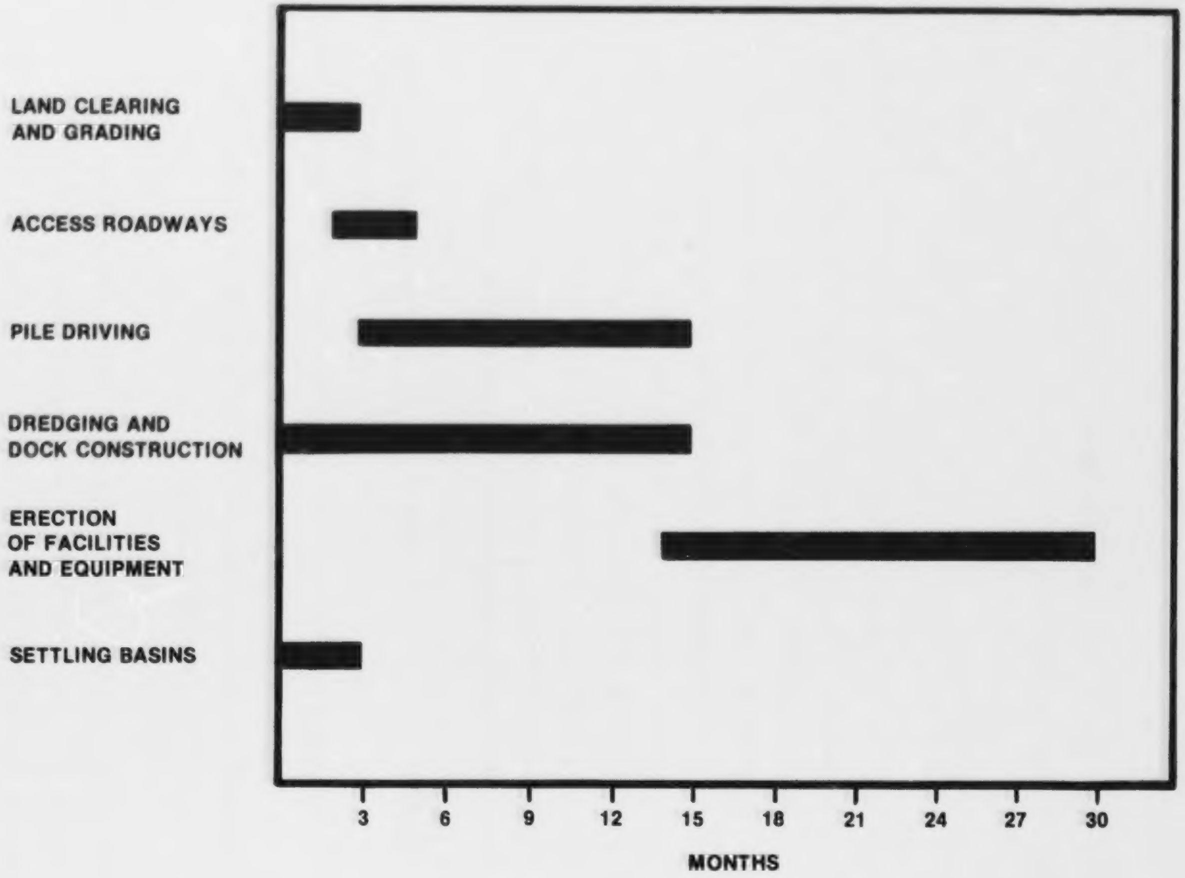

Figure A.9
SCHEDULE OF MAIN CONSTRUCTION TASKS

SOURCE. Brown & Root, Inc., 1977.

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Based on the preliminary design of the facilities, the sheet pile wall and the fill will be outside the brackish marsh area. The plant design has undergone many changes specifically to minimize disturbance of both the freshwater and brackish marshes. The only marsh area affected will be along the access roadway corridor on the plant's western boundary.

## Access Road

A 7.3-meter (24-foot) wide access road and railroad spur will be constructed in a 47.2-meter (155-foot) wide corridor along the western boundary of the property. The road will be paved with concrete and will have a bridge across the North Fork Deer River. The railroad spur will have a trestle across the river and the marshland. This work is expected to take the second through fifth months of the construction period.

During the early months of construction, a temporary roadway from Dauphin Island Parkway may be used and will enter the plant site near the southeastern corner of the property. The primary access to the plant site during construction and plant operation will be along the permanent access corridor from Island Road (Hamilton Boulevard).

The plant access road will cross over North Fork Deer River with a 15-meter (50-foot) long, 2-span bridge. The wetlands on both sides of the bridge (north and south) will be filled with approximately 3,400 cubic meters (4,450 cubic yards) to bring the grade of the road to about 3 meters (10 feet) above msl. This earth fill will cover a lineal distance of about 150 meters (500 feet) and represent the loss of approximately 0.2 hectares (0.5 acres) from the 3.0 hectares (7.3 acres) of freshwater marsh.

The plant access railroad will parallel the access roadway into the plant site. The total corridor of both road and railroad is about 47.2 meters (155 feet) wide. As with the road, the railroad will bridge the North Fork Deer River, but due to height and grade requirements, it will also bridge the adjacent wetlands. A 170-meter (560-foot) railroad bridge consisting of twenty 9-meter (28-foot) spans is planned. About 110 meters (350 feet) of freshwater marshland is to be affected by this crossing. In addition, about 840 cubic meters (1,100 cubic yards) of fill will be required to bring the grade of the access railroad to approximately 5 meters (15 feet) above msl. However, this fill will not be in the wetland area.

During construction, a small diversion channel will be formed to divert runoff upstream. Also about 46 cubic meters (60 cubic yards) of earth will be removed for the concrete casting of the railroad bridge substructures.

### Pile Driving

Due to the soil characteristics in the area and to the high bearing loads of the facility's structures and equipment, it is planned to drive approximately 14,000 to 16,000 piles. Pile driving will be done during the third to the fifteenth months of construction and will be restricted to daylight hours. The contractor will use the best practical equipment to reduce as much as possible the expected sound levels.

### Dredging and Construction of Docking Facility

Construction of the docking facility, which will be located approximately 60 meters (200 feet) from the toe of the ship channel, will require dredging along the entire 716-meter (2,350-foot) waterfront. The actual volume of dredged material will depend on the final depth specifications for the dock areas. The oceangoing vessels will require about a 9-meter (30-foot) depth, while the small barges need only about a 3-meter (10-foot) draft; however, a conservative depth of 12 meters (40 feet) below msl has been used to compute the volume of dredged material as 500,000 cubic meters (650,000 cubic yards). It is anticipated that this spoil will be taken to one of the Corps spoil disposal areas, pending approval of the Alabama State Docks Department (see Solid Wastes section). The docking facility, which will require the use of piles and sheet pilings, will be built at the beginning of the construction project (months 1 through 15).

## Erection of Facilities

Erection of buildings and process equipment, installation of utility connections for electricity, water, and sewage, and landscaping will be done during the fourteenth to thirtieth months of construction.

## Catchment Area

The general stormwater catchment area just north of the facility and the wastewater settling basin will be constructed and used as early as possible in the project schedule (months 1 to 3). Since the majority of the existing drainage is to the north, the general stormwater catchment area will be constructed first, and the area will treat the majority of the runoff from the construction areas.

The catchment area will be formed by two detention basins with grassy earthen berms. The berms will vary from .9 to 1.5 meters (3 to 5 feet) in height and 370 to 580 meters (1,220 to 1,900 feet) in length. A 90-meter (300-foot) section of the berm will be used as an overflow weir for handling runoff greater than 50 minutes of a 10-year, 1-hour storm (design capacity). In order to provide this capacity, the basins will be continuously drained to the freshwater marsh. It is estimated that the total earthwork of these berms will be about 9,860 cubic meters (12,900 cubic yards). All construction will be higher than the wetland vegetation boundary; therefore, the wetland area will not be disturbed by the construction of the stormwater catchment area.

## Equipment Needs

Throughout the construction period, there will be a need for various types of heavy equipment, such as bulldozers, cranes, scrapers, pile drivers, and front-end loaders. The anticipated requirements and schedule are shown in Table A.1. The bulk of the equipment will be used during the first 18 months of the construction phase.

Table A.1. Equipment Requirements (Plant Site)--30 Months

| Equipment | Project Duration (In Months) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **Earth Moving** | | | | | | | | | | |
| Push Dozers | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - |
| Scrapers | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - |
| Graders | 2 | 2 | 1 | 1 | 1 | 1 | - | - | - | - |
| Loaders | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 |
| Bulldozers | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Carry-Alls | 1 | 1 | 1 | 1 | - | - | - | - | - | - |
| Rollers, Compactors | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - |
| **Lifting** | | | | | | | | | | |
| Light Cranes | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 |
| Heavy Cranes | - | 1 | 1 | 3 | 3 | 3 | 2 | 1 | 1 | - |
| Cherry Pickers | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 2 | 1 | 1 |
| Forklifts | 3 | 3 | 3 | 5 | 5 | 5 | 4 | 2 | 1 | 1 |
| **Welding** | | | | | | | | | | |
| D & G Welders | 2 | 5 | 10 | 15 | 15 | 10 | 10 | 5 | 3 | 2 |
| Air Compressors | 2 | 4 | 8 | 8 | 8 | 6 | 4 | 2 | 1 | 1 |
| Portable Generators | 1 | 3 | 3 | 3 | 3 | 2 | 1 | - | - | - |
| **Paving and Concrete** | | | | | | | | | | |
| Backhoes | 3 | 5 | 8 | 8 | 5 | 2 | 2 | 1 | 1 | 1 |
| Portable Mixers | - | 3 | 4 | 5 | 5 | 2 | 1 | 1 | - | - |
| Vibrators | - | 1 | 2 | 5 | 5 | 5 | 3 | 3 | 1 | - |
| Rollers | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - |
| Asphalt Distributors | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - |
| Concrete Finishers | - | - | 2 | 5 | 10 | 10 | 5 | 2 | 1 | - |
| **Pile Drivers** | - | 3 | 3 | 3 | 3 | 2 | - | - | - | - |
| **Transporters** | | | | | | | | | | |
| Light Trucks | 5 | 10 | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 3 |
| Heavy Trucks | 3 | 4 | 4 | 6 | 6 | 4 | 3 | 3 | 3 | 2 |
| Flatbeds; Low Boys | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 |
| Dump Trucks | 10 | 10 | 10 | 10 | 5 | 1 | 1 | - | - | - |

Source: Brown & Root, Inc., 1977.

## PLANT OPERATIONS

### PROCESS DESCRIPTION

The cement plant will be a dry process facility designed to produce approximately 1.4 million metric tons (1.5 million tons) of cement each year. A "dry process" plant grinds and feeds the raw materials into the kiln in a dry state, rather than as a wet slurry. The advantage of the dry process is basically the 50-percent saving in fuel per unit of output.

In either process, the raw materials (limestone, clay, sand, and iron ore, or the chemical equivalents) are mixed and ground in specific proportions. The raw mix is then fed into a rotary kiln and heated to approximately 1,480°C (2700°F). At this temperature, the materials fuse and form clinker. The clinker is mixed and ground with gypsum into a powder called portland cement. If dry limestone is ground with the clinker and gypsum, a masonry cement is produced.

The Theodore cement plant will produce five types of portland cements and one masonry cement. Ideal Basic Industries will mine the required amounts of limestone from a new quarry in Monroe County (see quarry site section of this appendix), and the necessary quantities of clay and sand from their existing quarry at 24-Mile Bend on the Alabama River. The other raw materials (plus the coal that will be used as process fuel) will be obtained from contractors. The projected supply of limestone is adequate for at least 50 years, but the clay supply is estimated to last only through 1985. The future source of clay has not yet been designated.

This section summarizes the significant aspects of the process design currently planned by Ideal; however, as previously mentioned, there will be changes in the final design due to advancements in process technology and changes in facility requirements. However, the environmental assessment presented reflects the "worst case" air, water, noise, solid waste, and land use impacts which could result from any feasible process changes. Therefore, this assessment is considered a conservative evaluation of the environmental effects of the project.

The proposed process is shown schematically in Figure A.10.

## Raw Materials

In order to achieve the design capacity of 1.4 million metric tons (1.5 million tons) per year of dry cement, it will be necessary to handle approximately 3.0 million metric tons (3.4 million tons) per year of wet raw materials and coal.

The limestone will be shipped by a fleet of seventeen barges and three tugboats to the Theodore facility. The logistics of this marine operation will require four barges to be unloading while a tow (one tug and four barges) is en route, a second tow is returning to the limestone quarry site, and the last tow is being loaded at the quarry. The transit distance to the limestone quarry is approximately 180 kilometers (110 miles), whereas the clay and sand quarry is only about 60 kilometers (40 miles) upriver. The requirements for clay and sand necessitate that an extra barge be picked up at this quarry site every fourth tow. An independent contractor will supply iron ore by barge or rail. The gypsum and coal can be delivered by either railroad cars or vessels.

The raw materials unloading system consists of clamshell gantry cranes and conveyors to transfer the materials from their vessels to specific storage piles at a rate of 700 to 900 metric tons (800 to 1,000 tons) per hour. Since some of these piles (limestone and wet clay) are exposed to the weather, a system is planned to collect stormwater runoff and drain it into a settling basin. The basin will be designed to reduce the suspended solids loading prior to discharging the water to the ship channel. A more detailed description is given in the industrial wastewater section of this appendix.

The raw material requirements for each year are shown in Table A.2, and their storage supplies are given in Table A.3. The annual raw mix

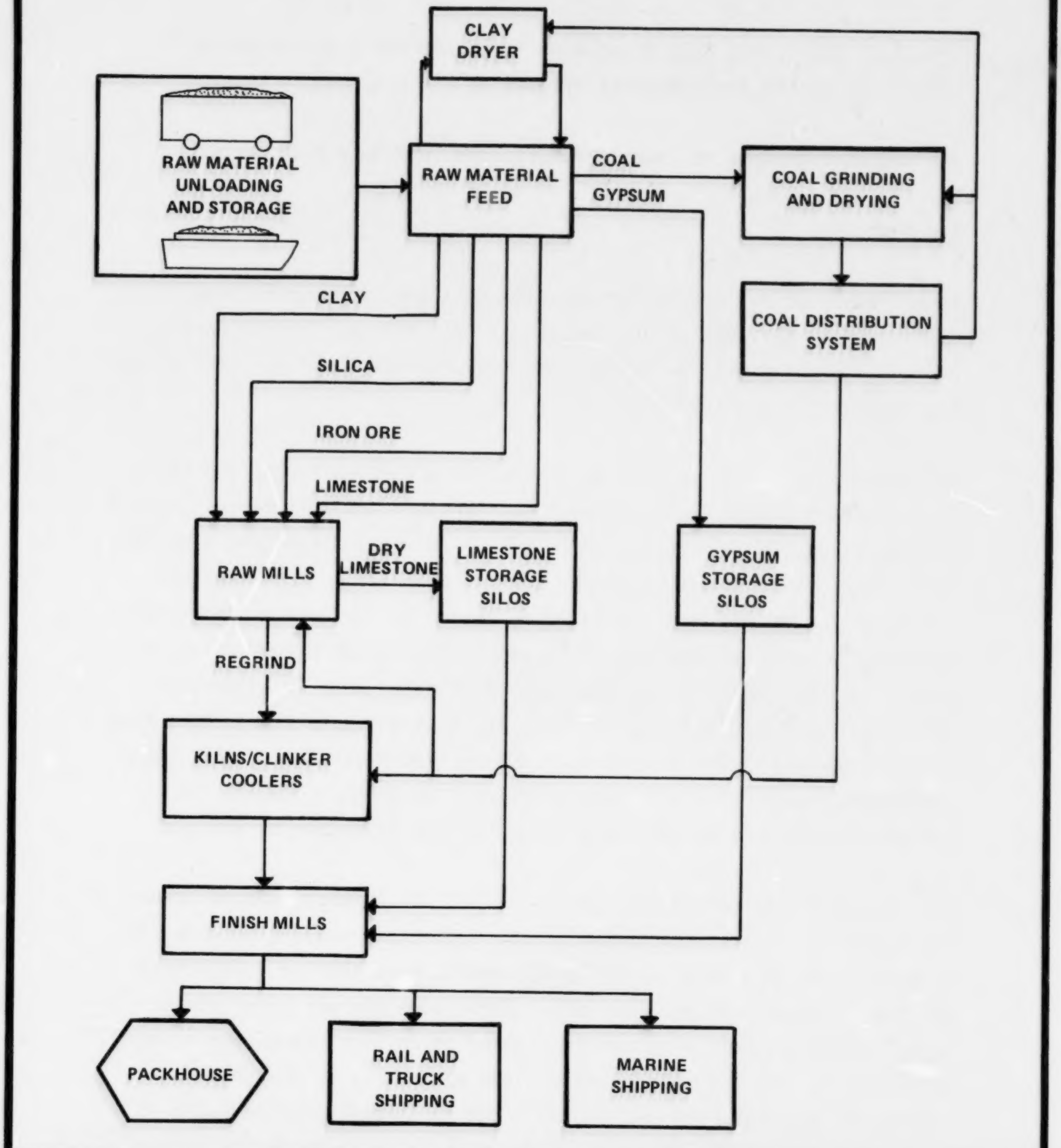
CLAY DRYER
RAW MATERIAL UNLOADING AND STORAGE
RAW MATERIAL FEED
COAL
GYPSUM
COAL GRINDING AND DRYING
COAL DISTRIBUTION SYSTEM
CLAY
SILICA
IRON ORE
LIMESTONE
RAW MILLS
DRY LIMESTONE
LIMESTONE STORAGE SILOS
GYPSUM STORAGE SILOS
REGRIND
KILNS/CLINKER COOLERS
FINISH MILLS
PACKHOUSE
RAIL AND TRUCK SHIPPING
MARINE SHIPPING

**Figure A.10**
FLOW DIAGRAM OF PROPOSED PLANT PROCESS

SOURCE: Environmental Science and Engineering, Inc., 1977.

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Table A.2. Raw Material and Fuel Requirements

| Material | Weight Per Year (Wet) | | | | | | Moisture Content (%) | Percentage of Mix | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Raw Mix | | Finish Grinding | | | | Portland | |
| | (Metric Tons) | (Tons) | (Metric Tons) | (Tons) | (Metric Tons) | (Tons) | | Raw Mix | Cement | Masonry |
| **Raw Materials** | | | | | | | | | | |
| Limestone | 2,414,200 | 2,661,200 | 2,341,400 | 2,581,000 | 72,700 | 80,100 | 22 | 87.6 | | 50 |
| Clay | 194,700 | 214,600 | 194,700 | 214,600 | — | — | 22 | 7.3 | | |
| Sand | 98,000 | 108,000 | 98,000 | 108,000 | — | — | 10 | 4.2 | 95.5 (as clinker) | 48.2 (as clinker) |
| Iron Ore | 20,400 | 22,500 | 20,400 | 22,500 | — | — | 5 | 0.9 | | |
| Gypsum | 61,000 | 67,300 | -- | -- | 61,000 | 67,300 | NA | 0.0 | 4.5 | 1.8 |
| TOTAL | 2,788,300 | 3,073,600 | 2,654,500 | 2,926,100 | 133,700 | 147,400 | | 100.0 | 100.0 | 100.0 |
| **Fuel** | | | | | | | | | | |
| Coal | 258,500 | 284,900 | — | — | — | — | 10 | — | — | — |
| TOTAL (Raw Materials and Coal) | 3,046,800 | 3,358,500 | — | — | — | — | — | — | — | — |

Sources: H.K. Ferguson and Associates, 1975.
Ideal Basic Industries, 1977.

Table A.3. Raw Materials Storage Supply (Wet Basis)

| | Storage Capacity | | Plant Usage (tpd) | | Storage Supply (Days) | Annual Operation (Days) |
|---|---|---|---|---|---|---|
| | Metric Tons | (Tons) | Metric Tons | (Tons) | | |
| Limestone (Active) | 110,000 | (120,000) | 7,788 | (8,585) | 14.0 | 310* |
| Limestone (Dead Storage) | 494,000 | (545,000) | -- | -- | 63.5 | -- |
| Clay | 4,200 | (4,600) | 645 | (711) | 6.5 | 302† |
| Sand | 4,200 | (4,600) | 325 | (358) | 12.8 | 302† |
| Iron Ore | 4,200 | (4,600) | 68 | (75) | 61.3 | 302† |
| Gypsum | 27,000 | (30,000) | 212 | (234) | 128.2 | 287** |
| Coal | 45,400 | (50,000) | 841 | (927) | 53.9 | 310* |

* Based on an average of 85 percent operating time for producing both portland and masonry cements.

† Based on only raw mill requirements. The remaining 8 days per year are for drying limestone to be used in the masonry cement. Due to the difference in operating days per year between the raw mill (302 days) and the kiln (310 days), the average usage rates for the kilns are 0.97 of those shown.

** Based on the capacities of the finish mills.

Source: Ideal Basic Industries, 1977.

materials are approximately double the annual cement production rate because of losses of moisture and carbon dioxide while processing the materials in the raw mill and kiln areas. The average moisture content of the raw materials is approximately 21 percent when received, but is reduced to less than 1 percent in the raw mill. In addition, 36 percent of the raw mix feed weight to the kilns is exhausted as carbon dioxide.

The clay material, which will contain about 22 percent moisture, may be too wet to be compatible with process requirements. Therefore, a clay dryer is being designed for possible construction and use. Approximately 125 mtph (138 tph) (wet basis) of clay will be fed into a rotary dryer which will be fired with about 5 mtph (6 tph) of coal. Hot combustion gases will dry the clay and will be exhausted through the No. 2 raw mill stack. About 98 mtph (108 tph) (dry basis) of clay will exit the dryer and be transferred to a belt conveyor; this transfer point will be vented to a small baghouse. The conveyor will bring the dried clay to the clay storage building which also will be vented through a small baghouse. To meet raw material requirements of 503 mtpd (555 tpd) of wet clay (7 days per week), the clay dryer will be designed to operate at least 7 hours per day for 5 days per week.

The coal requirements of the plant will be handled by unloading vessels or railroad cars at a rate of 600 to 900 mtph (700-1,000 tph). The coal as received will be stored in a covered area. From storage, the coal will be screened, crushed, and conveyed to a central drying mill. The mill will be an air-swept ball mill, with heated air from a small coal burner. The coal will be swept from the mill to a classifier and cyclone for sizing and collection. A baghouse will be used to control the particulate matter emissions from the mill exhausts.

The coal grinding and drying system will be designed to supply an average of about 840 metric tons (930 tons) of dry coal per day. The coal demand for process operations will generally follow a 24-hour per day schedule, so the dried coal will be transferred to a central storage tank to store enough dried coal to supply the entire plant's coal requirements.

From the tank, the coal will be conveyed to a tank for use in the following systems:

1. 1 or 2 kiln(s)--about 22 mtph (24 tph), 24 hours/day, 310 days/year
2. 1 coal dryer--about 3 mtph (3 tph), 24 hours/day, 310 days/year
3. 2 raw mills--about 5 mtph (6 tph), 24 hours/day, 310 days/year
4. 1 clay dryer--about 5 mtph (6 tph), 7 hours/day, 260 days/year

The central storage tank and a coal feed tank will be exhausted through separate baghouse systems. All estimates for coal usages are based upon coal with 6.7 calories per gram (12,000 Btu/lb) and a maximum sulfur content of 1.5 percent by weight.

The gypsum, which will be received by water or rail transport, will be handled by the same system as the coal. The gypsum will be stored in bulk in the covered stockpile area. Table A.3 shows that a 128-day supply of gypsum is planned by maintaining 27,000 metric tons (30,000 tons) in the stockpile.

In the raw materials storage and handling area (see Figure A.11), the raw materials will be reclaimed from storage and placed on conveyor belts for transfer to the raw mill circuit. In the first two areas, the raw mix materials will be exposed to the atmosphere and thus there is the potential for fugitive dust emissions. However, the majority of the materials will have a high moisture content (an average of 21 percent) which will lessen dust emissions. In addition, an extensive water-spray dust suppression system will be employed at major drop points and transfer points.

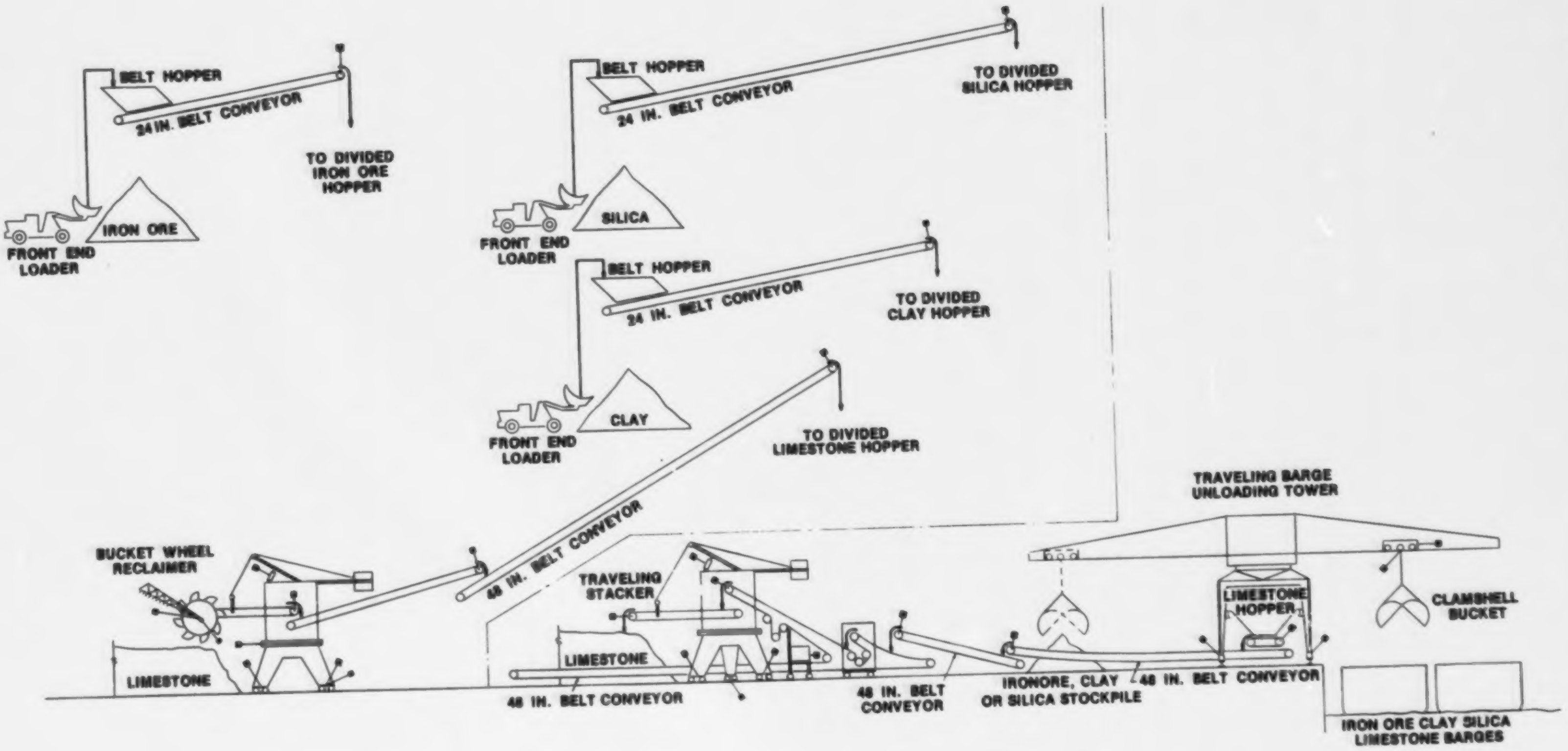
BELT HOPPER
24 IN. BELT CONVEYOR
TO DIVIDED IRON ORE HOPPER
IRON ORE
FRONT END LOADER
BELT HOPPER
24 IN. BELT CONVEYOR
TO DIVIDED SILICA HOPPER
SILICA
FRONT END LOADER
BELT HOPPER
24 IN. BELT CONVEYOR
TO DIVIDED CLAY HOPPER
CLAY
FRONT END LOADER
TO DIVIDED LIMESTONE HOPPER
48 IN. BELT CONVEYOR
BUCKET WHEEL RECLAIMER
LIMESTONE
TRAVELING STACKER
LIMESTONE
48 IN. BELT CONVEYOR
48 IN. BELT CONVEYOR
IRONORE, CLAY OR SILICA STOCKPILE
48 IN. BELT CONVEYOR
TRAVELING BARGE UNLOADING TOWER
LIMESTONE HOPPER
CLAMSHELL BUCKET
IRON ORE CLAY SILICA LIMESTONE BARGES

Figure A.11
RAW MATERIALS HANDLING FLOW DIAGRAM

SOURCE: H.K. Ferguson Associates, 1975.

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## Raw Mill

Starting in the raw materials circuit, the cement manufacturing process generally will be divided into two parallel systems, each designed to handle half the plant's process weight. Figure A.12 shows a flow diagram of the raw mill system's process materials and exhaust gases. The purpose of this system is to dry the raw materials, grind them to a fine consistency, and store them for use in the next area. The drying and grinding will be accomplished in systems using hot exhaust gases from each kiln and clinker cooler circuit and supplemented by heat from their own coal furnaces. The systems are air-swept mills that will each handle 185 mtph (204 tph) of wet raw mix plus 11 mtph (12 tph) of material entrained in the kiln cooler exhaust gases. After grinding, the materials and the exhaust gases will be passed through a classifier in which oversized material will be rejected to a vibrating screen for re-entry into the mill or discharged into a trash bin. The fines, which will be entrained in the exhaust gases, must be collected by an air pollution control system consisting of several cyclone collectors followed by a baghouse. The fines collected in the cyclones and baghouse are the "product" of each raw mill and amount to about 154 mtph (170 tph).

The exhaust gases and uncollected dust will be discharged into the atmosphere through separate 90-meter (300-foot) high stacks. It is estimated that 45 kilograms (98 pounds) per hour of particulate matter and, based on 50 percent removal due to process chemistry (see Air section), 898 kilograms (1,980 pounds) per hour of sulfur dioxide will be emitted through the stacks. The collected material will be conveyed to four raw mix storage silos to await further processing in the regrind mill and the homogenizing and kiln feed system. Since dry limestone is required for the masonry finish mix, at times the raw mill will process only limestone, which will be stored in a separate silo in the clinker storage circuit. Both of these silo systems will be serviced by baghouses to reduce dust emissions.

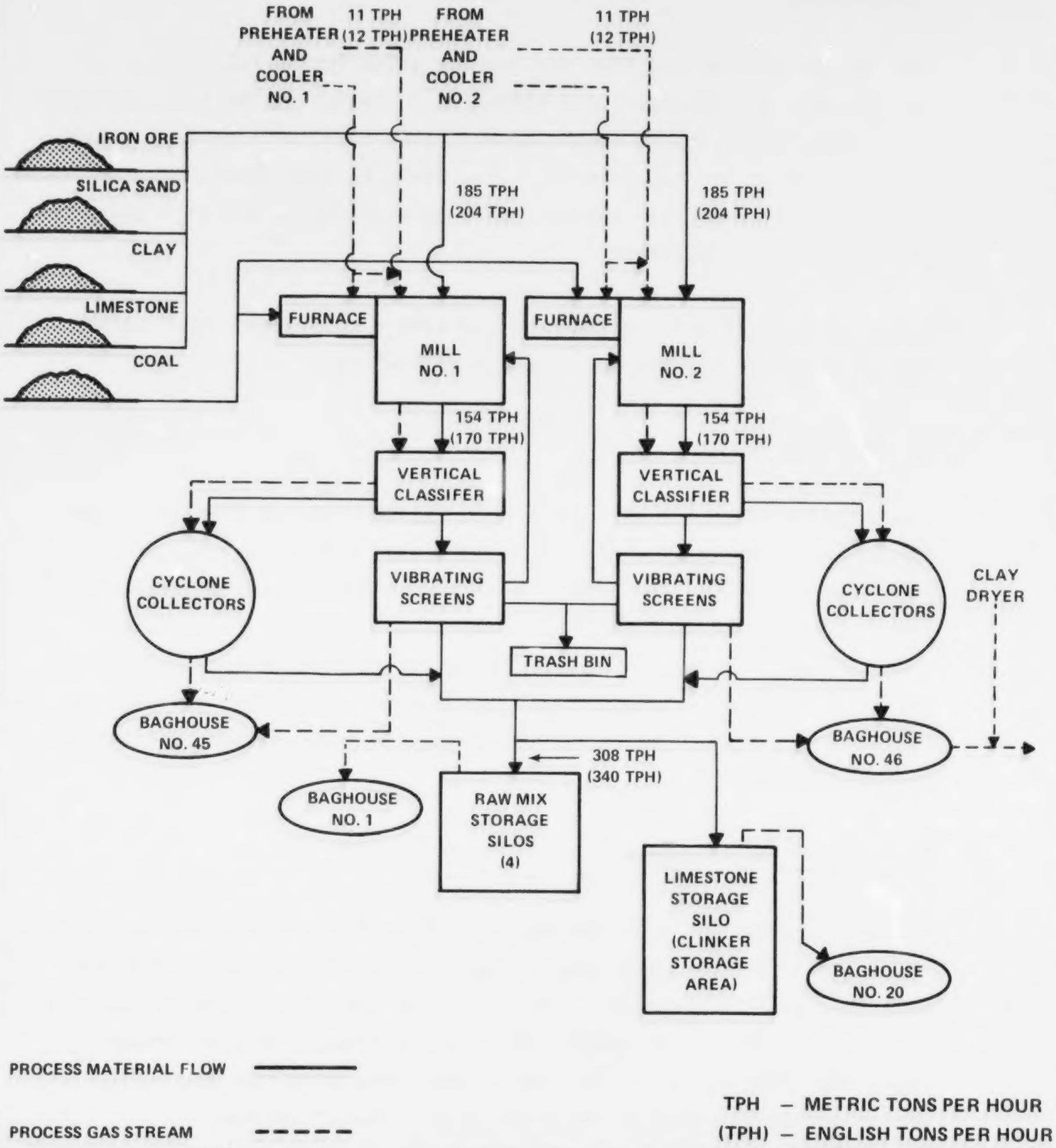
FROM PREHEATER AND COOLER NO. 1
11 TPH (12 TPH)
FROM PREHEATER AND COOLER NO. 2
11 TPH (12 TPH)
IRON ORE
SILICA SAND
CLAY
LIMESTONE
COAL
185 TPH (204 TPH)
185 TPH (204 TPH)
FURNACE
MILL NO. 1
FURNACE
MILL NO. 2
154 TPH (170 TPH)
154 TPH (170 TPH)
VERTICAL CLASSIFER
VERTICAL CLASSIFIER
CYCLONE COLLECTORS
VIBRATING SCREENS
VIBRATING SCREENS
CYCLONE COLLECTORS
CLAY DRYER
TRASH BIN
BAGHOUSE NO. 45
BAGHOUSE NO. 46
308 TPH (340 TPH)
BAGHOUSE NO. 1
RAW MIX STORAGE SILOS (4)
LIMESTONE STORAGE SILO (CLINKER STORAGE AREA)
BAGHOUSE NO. 20
PROCESS MATERIAL FLOW
PROCESS GAS STREAM
TPH – METRIC TONS PER HOUR
(TPH) – ENGLISH TONS PER HOUR

Figure A.12
RAW MILL SYSTEM

(ENGLIGH UNITS IN PARENTHESES)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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## Regrind Mill

The raw mix will be fed from the storage silos into a regrind circuit for fineness and secondary mix control. A single regrind mill, designed for a production rate of about 360 mtph (400 tph), will be in a closed circuit with an air separater to allow fines to pass through the circuit, while oversized material will be reground in the mill and sized again in the air separator.

Figure A.13 shows the regrind mill and kiln feed system. The regrind mill will be serviced by two baghouse collectors.

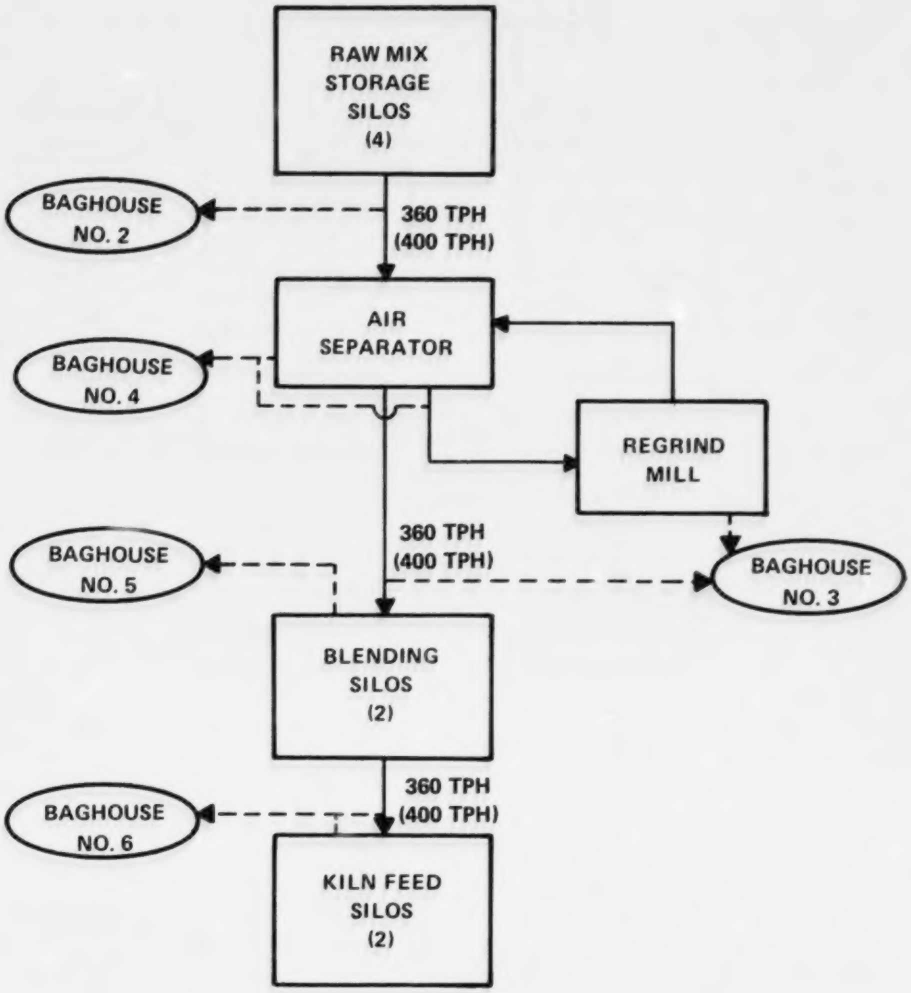
## Mix Blending

Fines passing the mill circuit will be passed into two blending silos for homogenizing the raw mix. Each silo will have a capacity of 3,240 metric tons (3,560 tons), which allows for a total of approximately 20 hours of regrind production to be blended. The blended materials will be fed into two 3,520-metric ton (3,880-ton) kiln feed silos for storage in order to provide a steady state feed into the two kilns. The blending and kiln feed silos will have a baghouse control system as shown.

## Kiln Suspension Preheaters

The kiln preheaters, kiln systems, and clinker cooler systems are shown in Figure A.14. Although twin systems are shown in these figures and described in this document, a single system may be utilized in the final design. The process parameters of a single system, such as process rate, fuel burning rates, exhaust volumes, and emissions should be approximately the same as the total from a "twin" system.

The blended materials will be transported into the preheater system through a series of air slide conveyors and elevators, which will be vented through baghouses. As shown in Figure A.15, the preheater will


RAW MIX STORAGE SILOS (4)
BAGHOUSE NO. 2
360 TPH (400 TPH)
AIR SEPARATOR
BAGHOUSE NO. 4
REGRIND MILL
360 TPH (400 TPH)
BAGHOUSE NO. 5
BAGHOUSE NO. 3
BLENDING SILOS (2)
360 TPH (400 TPH)
BAGHOUSE NO. 6
KILN FEED SILOS (2)

PROCESS MATERIAL FLOW ———

PROCESS GAS STREAM - - - - -

TPH – METRIC TONS PER HOUR
(TPH) – ENGLISH TONS PER HOUR

Figure A.13
REGRIND MILL AND KILN FEED SYSTEM

(ENGLISH UNITS IN PARENTHESES)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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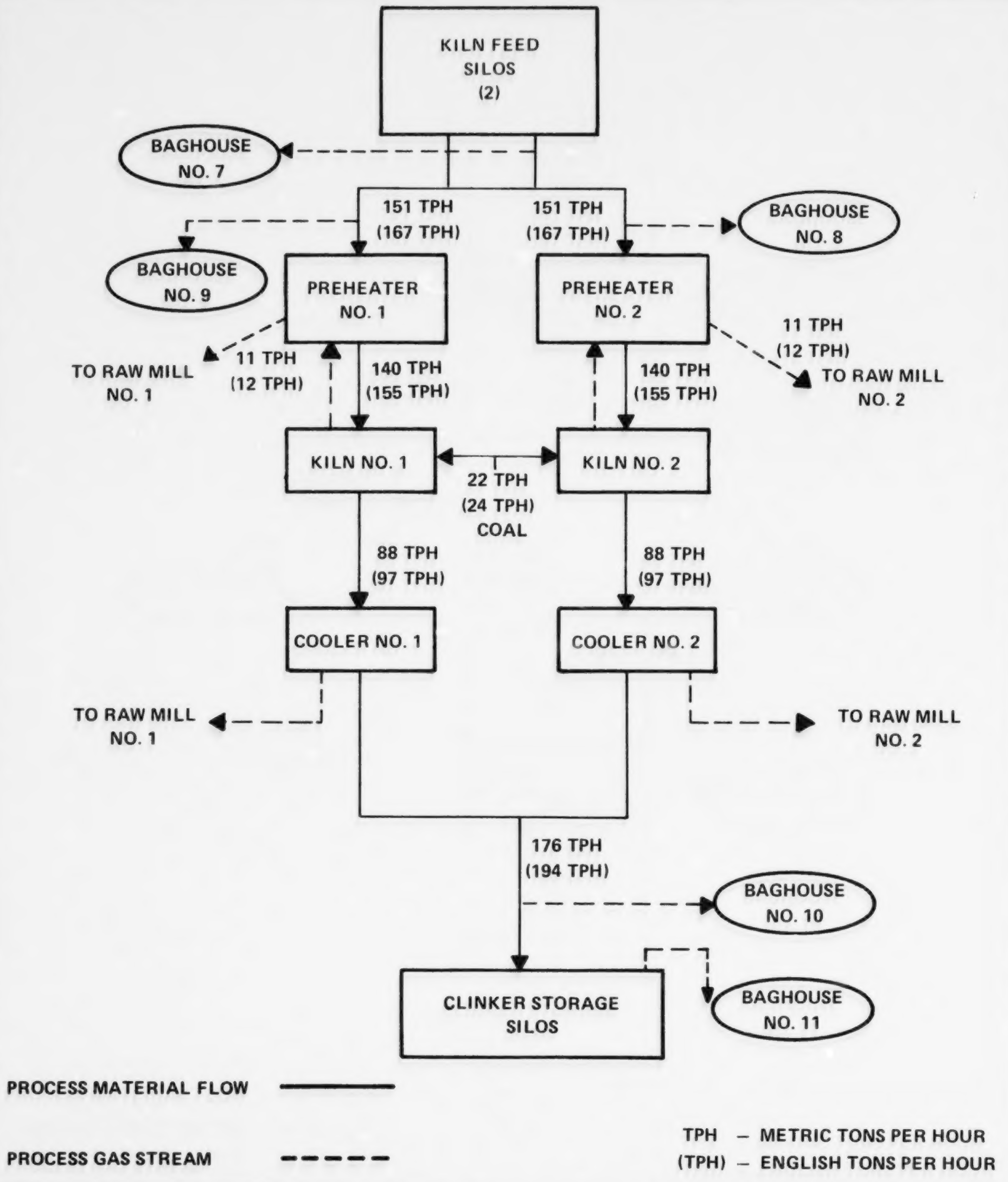
KILN FEED SILOS (2)
BAGHOUSE NO. 7
151 TPH (167 TPH)
151 TPH (167 TPH)
BAGHOUSE NO. 8
BAGHOUSE NO. 9
PREHEATER NO. 1
PREHEATER NO. 2
11 TPH (12 TPH)
TO RAW MILL NO. 1
11 TPH (12 TPH)
140 TPH (155 TPH)
140 TPH (155 TPH)
TO RAW MILL NO. 2
KILN NO. 1
KILN NO. 2
22 TPH (24 TPH) COAL
88 TPH (97 TPH)
88 TPH (97 TPH)
COOLER NO. 1
COOLER NO. 2
TO RAW MILL NO. 1
TO RAW MILL NO. 2
176 TPH (194 TPH)
BAGHOUSE NO. 10
CLINKER STORAGE SILOS
BAGHOUSE NO. 11
PROCESS MATERIAL FLOW
PROCESS GAS STREAM
TPH – METRIC TONS PER HOUR
(TPH) – ENGLISH TONS PER HOUR

Figure A.14
PREHEATER AND KILN/CLINKER COOLER SYSTEM

(ENGLISH UNITS IN PARENTHESES)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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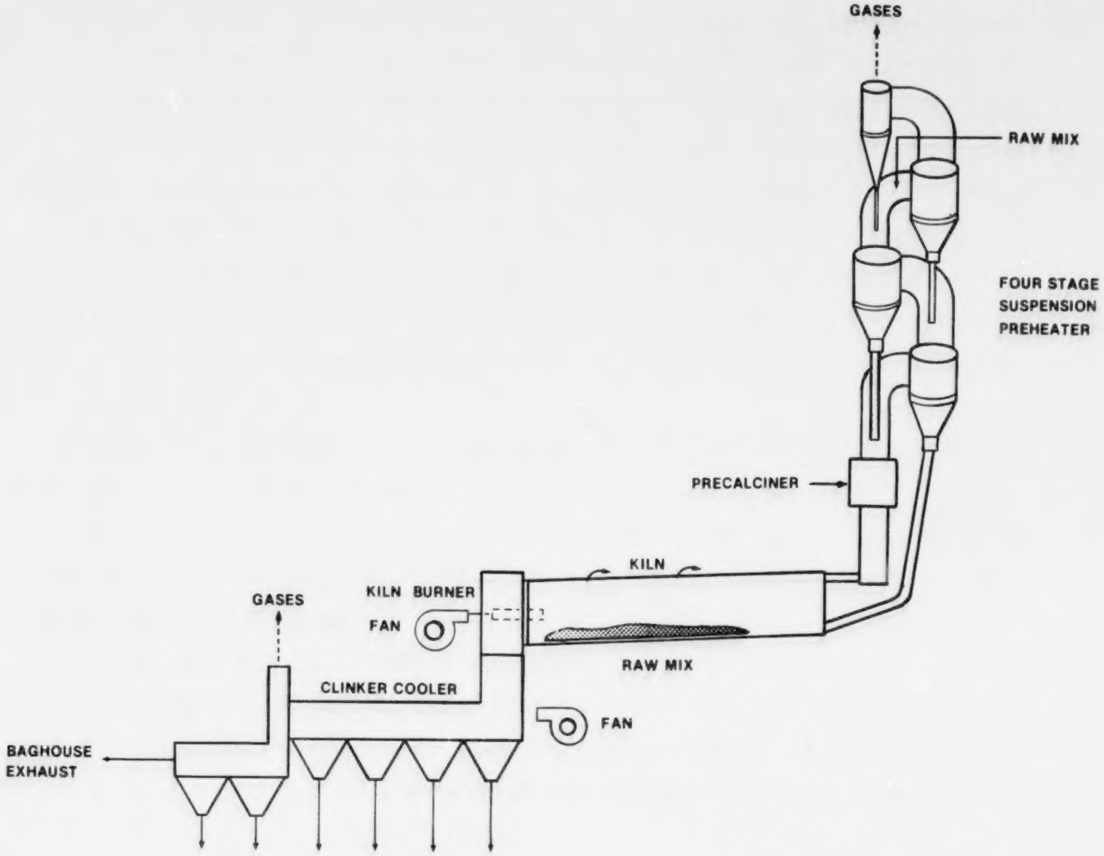
GASES
RAW MIX
FOUR STAGE SUSPENSION PREHEATER
PRECALCINER
KILN
KILN BURNER
FAN
RAW MIX
GASES
CLINKER COOLER
FAN
BAGHOUSE EXHAUST

Figure A.15
SKETCH OF PREHEATER, KILN AND CLINKER COOLER SYSTEM

SOURCE: Environmental Science and Engineering, Inc., 1977.

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be a four-stage system that will feed the raw mix down through each stage, counter to the kiln exhaust flow. The dust-laden gases will enter tangentially the top portion of each stage and will be spun downward. In order to be exhausted, the gases must make a sharp turn upward through the center of the preheater, thereby separating about 90 percent of the particulate matter from the gases. In this application of a preheater system, the raw mix will be fed into the entry of the second stage cyclone, suspended with the kiln exhaust gases, and separated, prior to exiting through a bottom hopper into the third stage. Likewise, the third stage will feed the fourth stage, which in turn will feed the kiln. The exhaust gases and dusts from the second stage will be fed into the first stage for collection of most of the entrained particulate matter for recycling into the system.

Approximately 11 mtph (12 tph), or 8 percent of the raw mix, will be exhausted with the kiln gases from the suspension preheaters to the raw mill system. Each preheater will handle 151 mtph (167 tph) of raw mix and will be designed to transfer the heat from the kiln's exhaust gases [about 1,000°C (1,850°F)] to the raw mix. The exhaust gas temperature from the preheaters should be about 350°C (650° F), and the raw materials after precalcination should enter the kiln at approximately 840°C (1,550°F). Approximately 140 mtph (155 tph) of raw mix will fall through each preheater system for feed into a kiln.

## Kilns

The dual kiln system will be fired with 22 mtph (24 tph) of coal to produce the temperatures [about 1,480°C (2,700°F)] required for formation of the clinker (see Figure A.15). Each kiln system will have a precalciner for greater thermal efficiency in producing the clinker. The raw mix will enter the precalciner from the third stage of the preheater and mix with the kiln's hot exhaust gases and with the heat from the precalciner's coal burner. The gases and the material are separated in the preheater's fourth stage, and the heated raw mix is fed into the kiln. The kiln is inclined and rotates so that the material tumbles towards the discharge end. The kiln will burn about 40 percent of the system's coal usage; the precalciner will burn the remaining 60 percent. At the point of exit, the raw mix will form fused, marble-like structures known as "clinker" [approximately 88 mtph (97 tph)]. An approximate weight loss of 36 percent is accounted for by the liberation of carbon dioxide from the limestone and of suspended particulate matter which is recycled into the system.

### Clinker Coolers

The clinker will be dropped from each kiln into separate inclined horizontal grate coolers where it will be reduced to about 93°C (200°F) by ambient air being blown through the grates. The clinker will then be conveyed to the clinker storage silos to await finish grinding.

The heated clinker cooler exhaust will be vented to the precalciner and raw mill circuits to supply heat and combustion air. The hot gases are supplemented with a coal burner to produce sufficient heat to dry the raw materials.

The kiln/clinker cooler/raw mill will have a common discharge system designed to economize on the heating requirements of the total cement process. The expected fuel consumption for the dry cement process is 0.7 million calories per metric ton (2.8 million Btu's per ton) of clinker.

### Finish Mill

The finish grinding mills are diagrammed in Figure A.16. In this area, the raw materials will be mixed and ground with the gypsum in an approximate 95 to 5 percent ratio to form the portland cement. In addition, clinker will be mixed and ground with gypsum and dry limestone in a ratio of 48 to 2 to 50 to produce masonry cement. It is planned that six different types of cement will be produced at the plant site. Table A.4 shows the finish mill requirement and the production figure for each type. Type I cement should account for 74 percent of production, and masonry cement for 8 percent. The process weight of each mill,

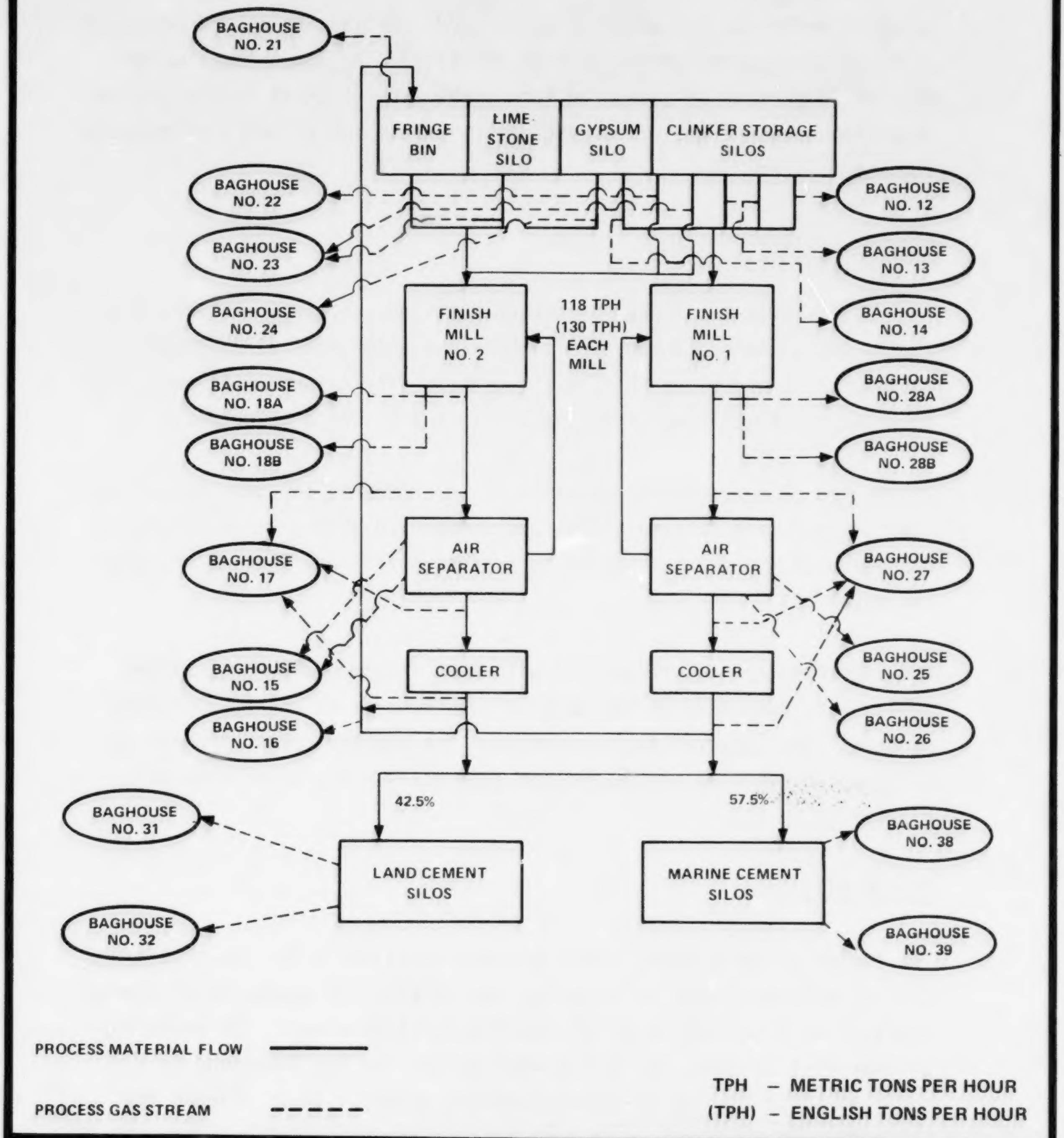
BAGHOUSE NO. 21
FRINGE BIN
LIME STONE SILO
GYPSUM SILO
CLINKER STORAGE SILOS
BAGHOUSE NO. 22
BAGHOUSE NO. 23
BAGHOUSE NO. 24
BAGHOUSE NO. 12
BAGHOUSE NO. 13
BAGHOUSE NO. 14
FINISH MILL NO. 2
118 TPH (130 TPH) EACH MILL
FINISH MILL NO. 1
BAGHOUSE NO. 18A
BAGHOUSE NO. 18B
BAGHOUSE NO. 28A
BAGHOUSE NO. 28B
AIR SEPARATOR
AIR SEPARATOR
BAGHOUSE NO. 17
BAGHOUSE NO. 27
BAGHOUSE NO. 15
COOLER
COOLER
BAGHOUSE NO. 25
BAGHOUSE NO. 16
BAGHOUSE NO. 26
42.5%
57.5%
BAGHOUSE NO. 31
LAND CEMENT SILOS
MARINE CEMENT SILOS
BAGHOUSE NO. 38
BAGHOUSE NO. 32
BAGHOUSE NO. 39
PROCESS MATERIAL FLOW
PROCESS GAS STREAM
TPH – METRIC TONS PER HOUR
(TPH) – ENGLISH TONS PER HOUR

**Figure A.16**
**FINISH CEMENT MILLS**

**(ENGLISH UNITS IN PARENTHESES)**

**SOURCE: Environmental Science and Engineering, Inc., 1977.**

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Table A.4. Finish Mill Requirements and Production Figures

| Cement Type | Annual Production Metric Tons | (Tons) | (%) | Mill Requirements % of Operating Time |
|---|---|---|---|---|
| I | 1,047,997 | (1,155,200) | 74.0 | 65 |
| IF | 65,450 | (72,200) | 4.5 | 4 |
| II | 65,450 | (72,200) | 4.5 | 4 |
| II MF | 65,450 | (72,200) | 4.5 | 5 |
| III | 65,450 | (72,200) | 4.5 | 10 |
| TOTAL (Portland Cements) | 1,309,797* | (1,444,000*) | | 88 |
| Masonry | 113,400† | (125,000†) | 8.0 | 12 |
| Total (All Cements) | 1,423,197 | (1,569,000) | 100.0 | 100 |

* Assuming 1,251,029 metric tons (1,379,000 tons) per year clinker used for portland cements.

† Assuming 56,700 metric tons (62,500 tons) per year clinker used for masonry cement.

Source: H.K. Ferguson Associates, 1975.

118 mtph (130 tph), applies to grinding Type I cement, since this will be the main type produced and will require the maximum grinding rate.

Each mill will be in a closed circuit with its own air separator to maintain the fineness quality of the finish product. Because of the heat generated, each mill will have its own cooler to reduce the cement's temperature prior to conveying to the silo areas. The finish mills will have a large number of baghouses associated with control of the dust generated in handling the finely ground cement.

## CEMENT STORAGE AND HANDLING

The plant will have two finished product storage areas--the marine silos for loading of oceangoing cement vessels and the land silos for all other shipments. The land silos will serve the bulk rail car and truck loading facilities as well as the packhouse operation (see Figure A.17). The packhouse is a bagging facility which gives Ideal Basic Industries an alternative market for its cement since it can be shipped by rail or truck. About 5 percent of the cement shipment is expected to be bagged; 62.5 percent of the bagged cement is expected to be masonry cement. The capacity of the two packing systems is 50 bags per minute.

The marine silos will serve the bulk loading of barges for transport to Louisiana and Florida. Figure A.18 shows the arrangement whereby four barge spouts can be used to load a vessel at a rate of 1,800 mtph (2,000 tph). As shown in both Figures A.17 and A.18, all transfer points and loading facilities will be ducted to baghouses.

The shipping schedule, as presented in Table A.5, is expected to vary slightly throughout the calendar year. The marine shipments are approximately 50 percent greater than all land shipments combined.

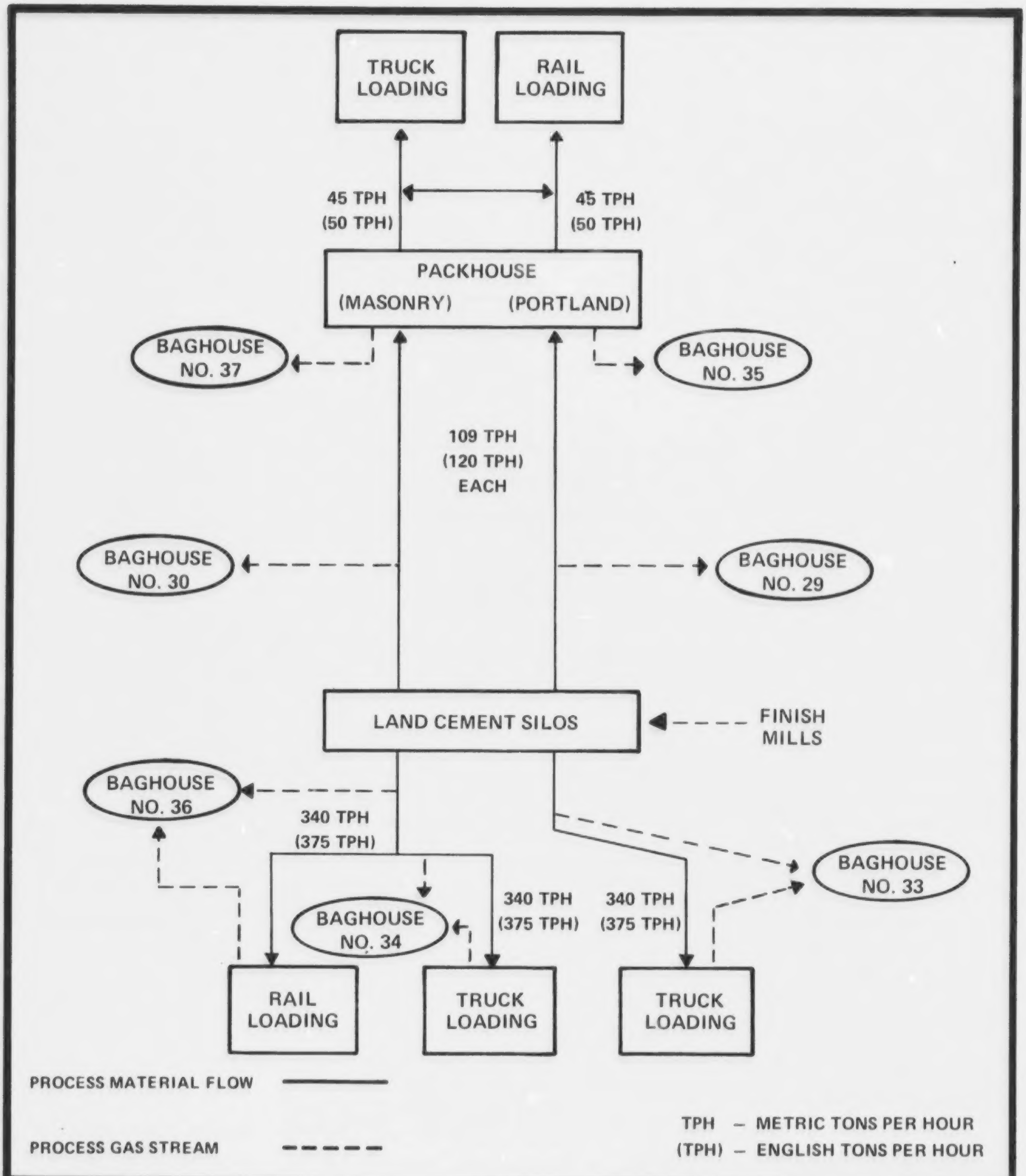
TRUCK LOADING
RAIL LOADING
45 TPH (50 TPH)
45 TPH (50 TPH)
PACKHOUSE
(MASONRY)
(PORTLAND)
BAGHOUSE NO. 37
BAGHOUSE NO. 35
109 TPH (120 TPH) EACH
BAGHOUSE NO. 30
BAGHOUSE NO. 29
LAND CEMENT SILOS
FINISH MILLS
BAGHOUSE NO. 36
340 TPH (375 TPH)
BAGHOUSE NO. 33
BAGHOUSE NO. 34
340 TPH (375 TPH)
340 TPH (375 TPH)
RAIL LOADING
TRUCK LOADING
TRUCK LOADING
PROCESS MATERIAL FLOW
PROCESS GAS STREAM
TPH – METRIC TONS PER HOUR
(TPH) – ENGLISH TONS PER HOUR

Figure A.17
LAND SILOS PROCESS FLOW

(ENGLISH UNITS IN PARENTHESES)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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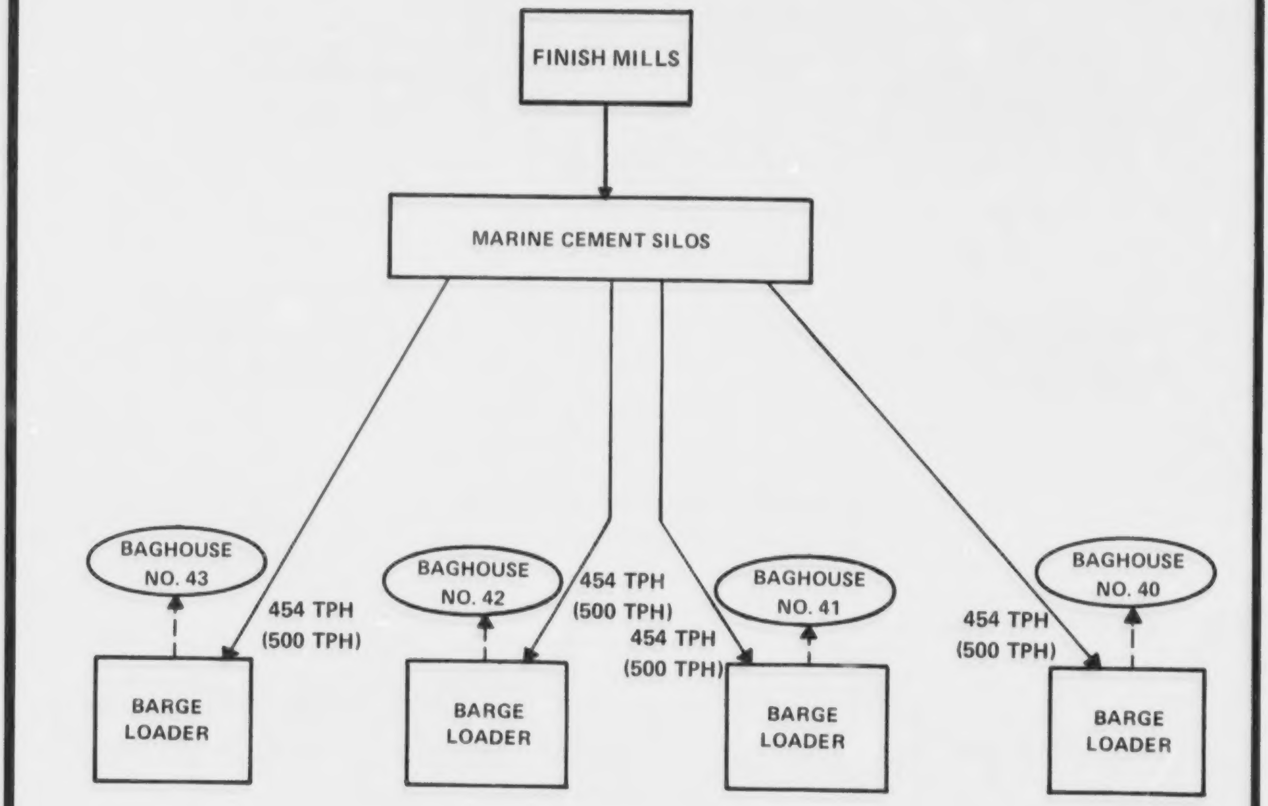
FINISH MILLS
MARINE CEMENT SILOS
BAGHOUSE NO. 43
454 TPH (500 TPH)
BAGHOUSE NO. 42
454 TPH (500 TPH)
BAGHOUSE NO. 41
454 TPH (500 TPH)
454 TPH (500 TPH)
BAGHOUSE NO. 40
BARGE LOADER
BARGE LOADER
BARGE LOADER
BARGE LOADER

PROCESS MATERIAL FLOW ———

PROCESS GAS STREAM - - - - -

TPH – METRIC TONS PER HOUR
(TPH) – ENGLISH TONS PER HOUR

Figure A.18
MARINE CEMENT SHIPPING

(ENGLISH UNITS IN PARENTHESES)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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Table A.5. Cement Shipment Schedule

| Type of Shipment | Annual Tonnage | | | | | |
|---|---|---|---|---|---|---|
| | Portland Cement | | Masonry Cement | | Total | |
| | Metric Tons | (Tons) | Metric Tons | (Tons) | Metric Tons | (Tons) |
| Marine | 751,200 | (828,000) | 68,000 | (75,000) | 819,200 | (903,000) |
| Land: Trucks | | | | | | |
| Bulk | 399,200 | (440,000) | 0 | 0 | 399,200 | (440,000) |
| Packed | 20,400 | (22,500) | 34,000 | (37,500) | 54,400 | (60,000) |
| SUBTOTAL | 419,600 | (462,500) | 34,000 | (37,500) | 453,600 | (500,000) |
| Railroad Cars | | | | | | |
| Bulk | 132,500 | (146,000) | 0 | 0 | 132,500 | (146,000) |
| Packed | 6,800 | (7,500) | 11,400 | (12,500) | 18,100 | (20,000) |
| SUBTOTAL | 139,300 | (153,500) | 11,400 | (12,500) | 150,600 | (166,000) |
| TOTAL Land | 558,800 | (616,000) | 45,400 | (50,000) | 604,200 | (666,000) |
| TOTAL Marine & Land | 1,310,000 | (1,444,000) | 113,400 | (125,000) | 1,423,400 | (1,569,000) |

Note: Truck capacity: 23 metric tons (25 tons) per bulk truck
25 metric tons (28 tons) per packed truck

Railroad car capacity: 91 metric tons (100 tons) per bulk car
86 metric tons (95 tons) per packed car

Source: H.K. Ferguson Associates, 1975.

The Louisiana fleet will consist of two tows and will take approximately 5.4 days per trip. The Florida fleet will consist of an oceangoing vessel which will make a round trip in approximately 5.8 days.

The land fleet will consist of trucks and railroad cars. Each truck is expected to hold 23 metric tons (25 tons) bulk or 25 metric tons (28 tons) packed, and each railroad car is sized for 91 metric tons (100 tons) bulk and 86 metric tons (95 tons) packed.

## ENVIRONMENTAL CONSIDERATIONS

### RESOURCES REQUIRED

The resources needed for the daily operation of the cement plant are depicted in Figure A.19. The daily resources cycle shows that approximately 9,900 metric tons (10,900 tons) of wet raw materials (limestone, clay, sand, iron ore, gypsum, and coal) are required to produce 4,600 metric tons (5,100 tons) of dry cement.

### Limestone

The quarry to be developed in Monroe County will supply the cement plant by barge transport with approximately 7,788 metric tons (8,585 tons) of wet limestone per day. This property contains over a 50-year supply of limestone.

### Clay and Sand

The clay and sand will be obtained from an existing quarry located on the 24-Mile Bend tract along the Alabama River approximately 60 kilometers (40 miles) from the proposed plant site. A tow from the limestone quarry will periodically as required pick up a loaded barge at 24-Mile Bend to meet the plant's daily requirements of 645 metric tons (711 tons) of clay (wet basis) and 325 metric tons (358 tons) of sand (wet basis).

Based upon a 1970 estimate of the acceptable clay and sand reserves, 5 years of quarry capacity remain after start-up of the proposed plant. Ideal Basic Industries will evaluate other sources of clay and sand to replace this facility, but investigation of these sources is beyond the scope of this EIS.

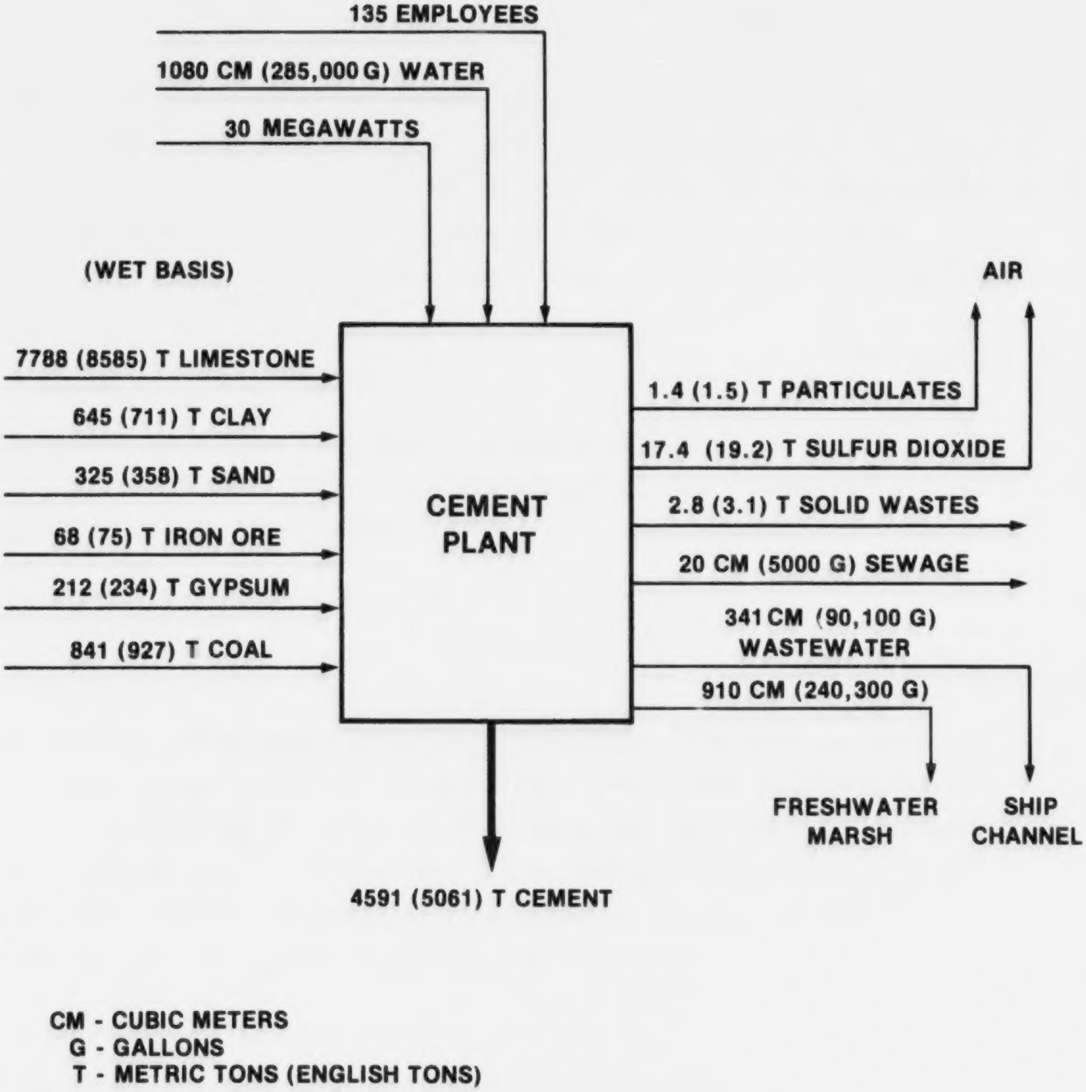
135 EMPLOYEES
1080 CM (285,000 G) WATER
30 MEGAWATTS
(WET BASIS)
AIR
7788 (8585) T LIMESTONE
645 (711) T CLAY
325 (358) T SAND
68 (75) T IRON ORE
212 (234) T GYPSUM
841 (927) T COAL
CEMENT PLANT
1.4 (1.5) T PARTICULATES
17.4 (19.2) T SULFUR DIOXIDE
2.8 (3.1) T SOLID WASTES
20 CM (5000 G) SEWAGE
341 CM (90,100 G) WASTEWATER
910 CM (240,300 G)
FRESHWATER MARSH
SHIP CHANNEL
4591 (5061) T CEMENT
CM - CUBIC METERS
G - GALLONS
T - METRIC TONS (ENGLISH TONS)

Figure A.19
DAILY RESOURCES CYCLE (PLANT SITE)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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## Iron Ore

A vendor will fulfill the plant's daily iron ore requirements, 68 metric tons (75 tons) on a wet basis, via a barge or rail transport system. The vendor has not yet been chosen, and the specific type of iron ore will depend on a final materials analysis.

## Gypsum

The gypsum, approximately 212 metric tons (234 tons) on a wet basis per day, will be obtained from a commercial supplier. The gypsum will be received from an oceangoing vessel or from railroad cars, depending on the location of supplier and the post-1980 economics of transportation.

## Coal

The coal required, approximately 841 metric tons (927 tons) on a wet basis per day, will be supplied on a contract basis to be negotiated at a later time with a currently unspecified vendor. Due to process constraints, the coal must have a sulfur content less than 1.5 percent by weight. Either railroad or water transportation of the coal will be acceptable.

## Electricity

The electrical service to the plant will be at 13.8 kilovolts with an on-site substation. Approximately 30 megawatts will be required during normal operations of the various process equipment. The electricity will be purchased from Alabama Power Company. Present plans for the transmission system to service the cement plant indicate that aboveground power lines will be located within the roadway/railroad spur access corridor.

## Water

The daily requirements for potable and process cooling make-up water will be 1,080 cubic meters (285,000 gallons), which will be supplied by the Board of Water and Sewer Commissioners of the City of Mobile.

## Labor

The plant will follow a 24-hour per day operating schedule throughout the year. However, because of the usual operational and maintenance problems, only an 85 percent (310 days per year) operating rate is projected for pyroprocess systems (raw mill, preheater, precalciner, kiln/cooler). A total of 135 employees will be needed to operate the Theodore facility--109 hourly employees and 26 supervisory employees. Most of these workers will be transferred from the existing Mobile cement plant. The annual payroll at Theodore will be approximately $3,000,000 in 1977 dollars.

In addition, the plant will be supported by the Monroe County limestone quarry with 19 employees, the 24-Mile Bend Clay and Sand Quarry with 10 employees, and a marine fleet operated by 50 workers. The annual operating payrolls (in 1977 dollars) are estimated to be: the marine facilities, $1,000,000; the limestone quarry, $400,000; and the 24-Mile Bend Quarry, $110,000. (The marine fleet may be operated partially or totally by a contractor.)

The plant staff will be supported by outside contractors who will be responsible for the transport of some raw materials to the plant and for the hauling of bulk and packaged cement by truck and rail.

## Water Transportation

Marine operations will be composed of the following vessels:

Inbound

Limestone Barges: 3 tugs, 16 barges

Clay and Sand Barges: 2 barges

Outbound

Louisiana Vessels: 2

Florida Vessels: 1

Approximately 819,200 metric tons (903,000 tons) of cement per year will be shipped by these vessels.

### Land Transportation

Annually the plant will ship approximately 604,200 metric tons (666,000 tons) of portland and masonry cements by land transportation. Both trucks and railroad cars will be used, in a tonnage ratio of 3:1. These services will be leased/contracted or provided by the buyers. On an average day, approximately 55 to 75 trucks and 5 to 7 railroad cars will be loaded and shipped to customers.

The plant outputs, as shown in Figure A.19, are the conversion products of the resources already mentioned. These outputs are described in detail in the remaining sections of this appendix and are typically based on annual outputs divided by 365 days per year.

## AIR POLLUTANT EMISSIONS

### Stack Emissions

The proposed cement plant, once constructed and operating, will have controlled air emissions from approximately 62 individual sources. Particulate matter from the plant processes will be exhausted from raw materials handling; clay and coal dryers; the combined exhaust from the raw mill/kiln preheater/kiln/clinker cooler system; the regrind mill; finish mills; and the storage and shipping operations. Fuel burning operations to provide heat to the cement manufacturing operations will have emissions of sulfur dioxide, nitrogen oxide, hydrocarbons, and carbon monoxide, in addition to particulate matter. The flow diagram shown in Figure A.20 illustrates the major cement manufacturing processes which will be conducted at the proposed plant and the types of air pollutants associated with each process.

A summary of the maximum allowable particulate matter and sulfur dioxide emissions and the estimated quantities of other criteria pollutants is presented in Table A.6. The allowables (particulate matter and sulfur dioxide) are based upon the Prevention of Significant Deterioration (PSD) application approved by EPA (see Permit and Approval section of the Summary Document). They reflect Alternative I (kiln and clinker cooler exhausting through the raw mill stacks) and present a worst-case situation that will not be exceeded.

The pollutants of nitrogen oxides, hydrocarbons, and carbon monoxide, although not applicable to the PSD regulation for this project, are estimated based on emission factors (U.S. EPA, 1975) for similar operations. These emissions represent the remaining criteria pollutants that have National Ambient Air Quality Standards (NAAQS) and have been shown or have the potential to be emitted from a dry cement plant.

### Particulate Matter Emissions

Particulate matter emissions from the proposed plant will be generated primarily by the movement of the process gas streams in the presence of the raw mix and cement dust (such as in drying and grinding processes)

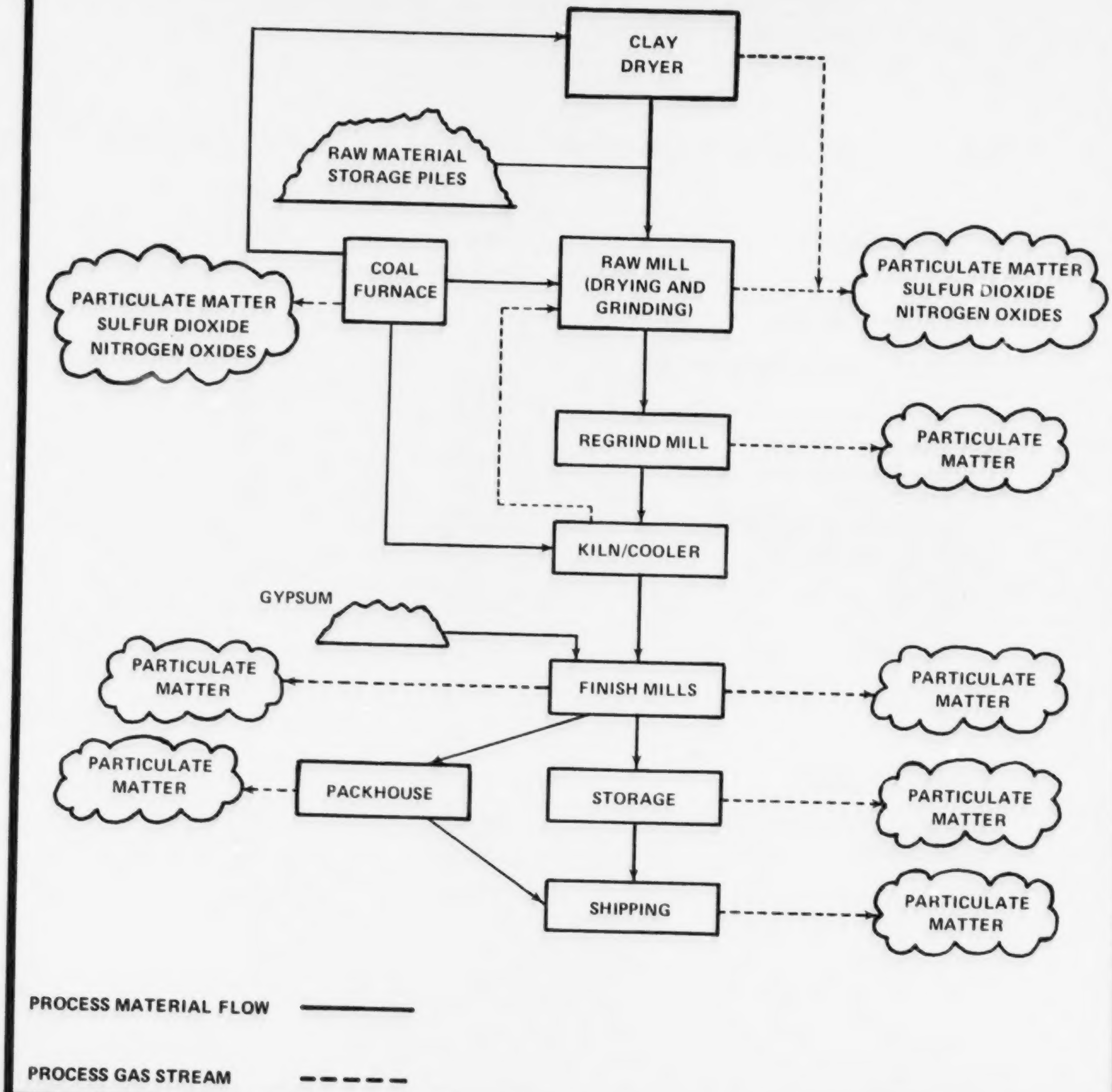
CLAY DRYER
RAW MATERIAL STORAGE PILES
COAL FURNACE
RAW MILL (DRYING AND GRINDING)
PARTICULATE MATTER SULFUR DIOXIDE NITROGEN OXIDES
PARTICULATE MATTER SULFUR DIOXIDE NITROGEN OXIDES
REGRIND MILL
PARTICULATE MATTER
KILN/COOLER
GYPSUM
PARTICULATE MATTER
FINISH MILLS
PARTICULATE MATTER
PARTICULATE MATTER
PACKHOUSE
STORAGE
PARTICULATE MATTER
SHIPPING
PARTICULATE MATTER
PROCESS MATERIAL FLOW
PROCESS GAS STREAM

Figure A.20
CEMENT MANUFACTURING PROCESS, IDEAL BASIC PROPOSED PLANT, THEODORE, ALABAMA
(Adapted from H.K. Ferguson Associates, 1975.)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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Table A.6. Maximum Allowable Atmospheric Emissions from the Proposed Cement Manufacturing Plant for Particulate Matter and Sulfur Dioxide and Estimated Quantities of Other Pollutants: Nitrogen Oxides, Hydrocarbons, and Carbon Monoxide

| | Allowable | |
|---|---|---|
| Pollutant/Source | Grams/ Sec | (lbs/ hour) |
| **Particulate Matter** | | |
| Raw Mills/Kilns/Coolers* and Clay Dryer | 12.4 | 98 |
| Regrind Mill | 0.6 | 4 |
| Kiln/Cooler System** | 0.8 | 6 |
| Gypsum Storage and Unloading | 0.2 | 2 |
| Finish Mills | 2.6 | 21 |
| Clay Handling System | 0.2 | 2 |
| Coal Drying System | 2.9 | 23 |
| Shipping | | |
| Marine | 0.6 | 5 |
| Land | 0.3 | 2 |
| Packhouse | 0.3 | 3 |
| TOTAL | 20.9 | 166 |
| **Sulfur Dioxide†** | | |
| Raw Mill/Kiln/Clay Dryer | 249.4 | 1,980 |
| Coal Dryer | 22.7 | 180 |
| TOTAL | 272.1 | 2,160 |

Table A.6. Maximum Allowable Atmospheric Emissions from the Proposed Cement Manufacturing Plant for Particulate Matter and Sulfur Dioxide and Estimated Quantities of Other Pollutants: Nitrogen Oxides, Hydrocarbons, and Carbon Monoxide (Continued, page 2 of 2)

| Pollutant/Source | Estimated Grams/ Sec | (lbs/ hour) |
|---|---|---|
| Nitrogen Oxides | | |
| Raw Mill/Kiln/Clay Dryer | 131.5 | 1,044 |
| Coal Dryer | 20.8 | 165 |
| TOTAL | 152.3 | 1,209 |
| Hydrocarbons | | |
| Raw Mill/Kiln/Clay Dryer | 0.3 | 3 |
| Coal Dryer | 0.1 | 1 |
| TOTAL | 0.4 | 4 |
| Carbon Monoxide | | |
| Raw Mill/Kiln/Clay Dryer | 1.1 | 9 |
| Coal Dryer | 0.4 | 3 |
| TOTAL | 1.5 | 12 |

*Kilns/coolers exhaust through raw mill.

†Calculated based upon 1.5 percent sulfur coal, 100 percent conversion of S to $SO_2$.

**Excluding kiln/cooler emissions (included in raw mill estimates) for raw mix and clinker exhausts.

Sources: H.K. Ferguson Associates, 1975.
Ideal Basic Industries, 1977.
Prevention of Significant Deterioration Application, Volumes I and II, 1977.

and by the transfer, conveying, and storage of these materials. The dust-laden exhausts will be passed through high efficiency collection devices, known as baghouses, before being vented to the atmosphere through stacks. These emissions are limited by local and State of Alabama standards and by New Source Performance Standards (see the Permit and Approval section of the Summary Document). Collected dusts from the air pollution control devices will be recycled into the process, conserving raw materials and products and eliminating a solid waste disposal problem.

Particulate matter emissions from all baghouses, except those servicing the raw mill/kiln/cooler exhaust system and the coal dryer, were estimated based upon an outlet dust loading of 0.02 g/dscm (0.01 gr/dscf). Emissions from these baghouses should exhibit zero opacity and therefore meet the 10 percent maximum opacity requirement (NSPS) for cement processing operations. Particulate matter emissions from the raw mill/kiln/clinker coolers were based upon the New Source Performance Standards (NSPS) for cement kilns and clinker coolers, respectively, which specify a limit of 0.15 kg/metric ton (0.3 lb/ton) of dry feed to the kiln and 20 percent opacity. Normal dry feed to the kilns will be 140 metric tons (155 tons) per hour each, resulting in an allowable particulate emission rate of 5.8 grams per second (46.5 lb/hr) from each kiln. Particulate matter emissions from the coal dryer are based upon an outlet dust loading of 0.07 g/dscm (0.031 gr/dscf), which complies with the applicable NSPS.

## Other Emissions

Reduction of sulfur dioxide emissions can be achieved through the contact with the alkaline cement dust. The alkaline nature of the cement and its major raw material (limestone) allows the direct absorption of sulfur dioxide into the product. The sulfur dioxide generated in the cement kiln by combustion of coal will be exhausted through the length of the kiln and will thereby have contact with the alkaline materials as they tumble in the reverse direction.

In addition, these gases will be exhausted through the preheater tower and the raw mill's drying and grinding circuit, thereby having additional contact with alkaline materials. The combustion gases from the precalciner and raw mill will contain sulfur dioxide which will be reduced by being combined with the kiln's gases as they are exhausted through these process systems and finally through the baghouse prior to being discharged to the ambient air.

When baghouses are used to control particulate matter emissions, overall reduction of sulfur dioxide is stated to be as high as 75 percent due to the intimate contact with the alkaline dust coating on the bags (U.S. EPA, Office of Air Quality Planning and Standards, 1975). As previously stated, Ideal Basic Industries will use baghouses to clean all exhaust air streams; therefore, a similar reduction in sulfur dioxide emissions is expected from the kiln/raw mill systems. (The coal dryer and clay dryer exhausts will not contact alkaline dust and no reduction of sulfur dioxide is anticipated).

Coal with an expected maximum of 1.5 percent sulfur content by weight will be burned in the kilns, clay dryer, coal dryer, precalciners, and the raw mill furnaces. In estimating sulfur dioxide emissions from fuel burning, all available sulfur in the coal was assumed to be converted to sulfur dioxide and no inherent removal of sulfur dioxide was considered. Laboratory analysis has shown that trace amounts of sulfur (0.03 percent) are present in the raw materials Ideal Basic Industries will utilize (Ideal Basic Industries, 1975). By controlling the amount of excess air within the kilns to normal operating conditions, sulfur will not be liberated from the raw materials in the process. Therefore, the sulfur dioxide emissions shown in Table A.6 reflect emissions from fuel burning only.

For estimating emissions of nitrogen oxides, hydrocarbons, and carbon monoxide from fuel burning, emission factors for cement kilns and coal combustion (for the raw mill furnaces and coal and clay dryers) were utilized (U.S. EPA, Office of Air Quality Planning and Standards, 1975).

## Baghouses

The baghouses currently under design consideration are the pulse compressed air type for most smaller gas flows and the shaker pulse compressed air and reverse air types for the larger and typically hotter gas flows. When high temperature is not a problem, a dacron polyester filter material will be used. Hotter gas streams not containing sulfur emissions will require a DuPont "Nomex" bag material. The hot exhausts with sulfur compounds must have bags of a fiberglass material which is more resistant to sulfur compounds than the Nomex. These materials can provide a filtering performance better than the 0.02 g/dscm (0.01 gr/dscf) grain loading guaranteed for each baghouse servicing raw cement/raw material production units.

A schematic diagram of a typical pulse compressed air baghouse arrangement is shown in Figure A.21. The exhaust gases will pass through the filter material, but the dust will be captured by the bag surface and form a dust coating. In each of the three types of baghouses, this dust coating must be periodically removed to maintain proper air flows. The basic concept in any baghouse is to loosen the dust and allow it to fall into the bottom collection hopper for easy removal. The difference in baghouses is the way in which this cleaning cycle is accomplished.

The pulse compressed air type uses a blast of compressed air down through the clean side of a bag to quickly flex the fabric and break up the dust coat. This is performed while the unit is in full operation.

The shaker type, as the name implies, shakes the bags for dust removal. This is usually performed with one of several modules of bags off-line, to prevent re-entrainment problems. The reverse air unit has a multi-compartment design that shuts off one section of bags and allows clean air to flow backwards through the bag to slightly flex the material for dust removal.

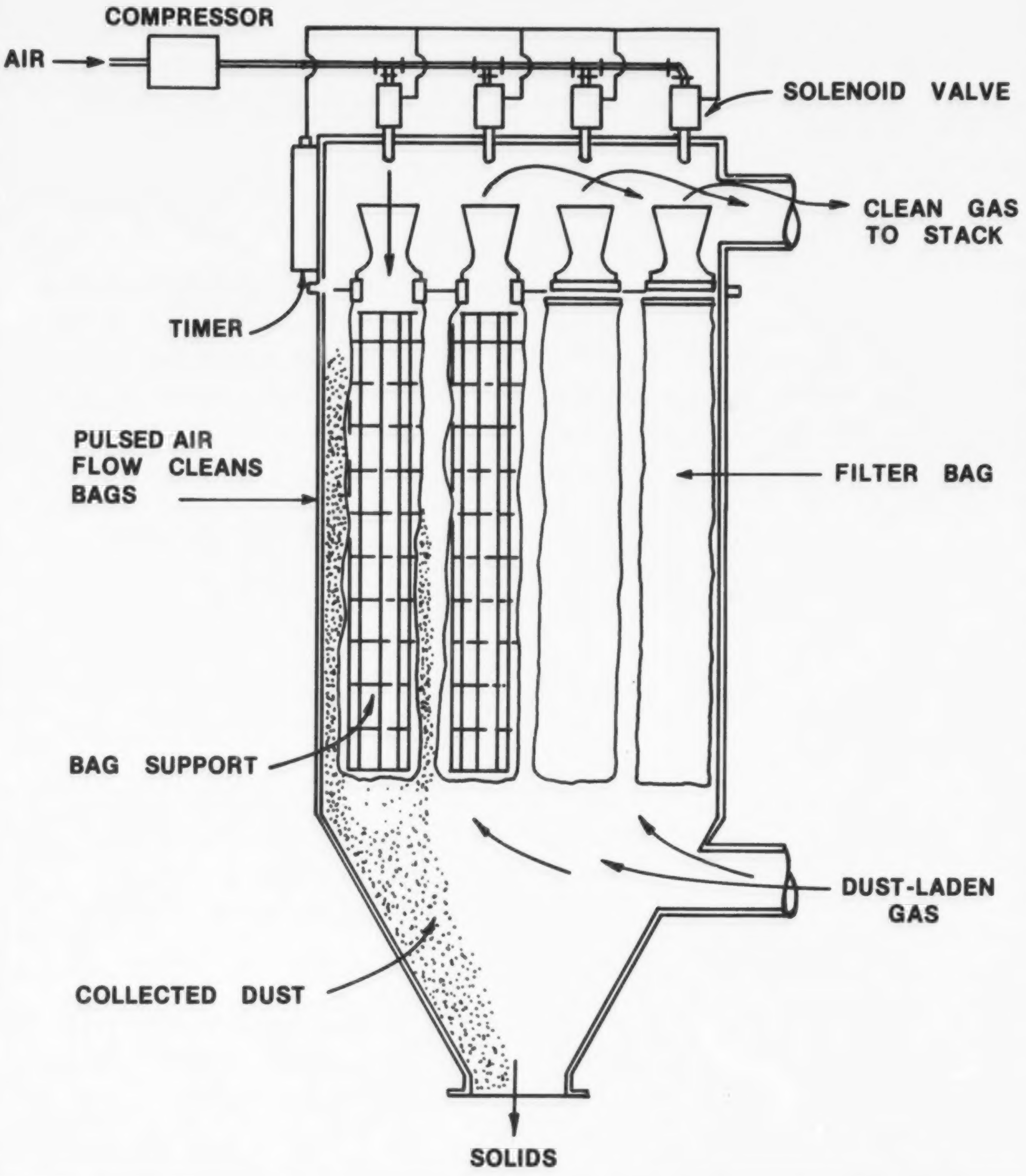
COMPRESSOR
AIR
SOLENOID VALVE
CLEAN GAS TO STACK
TIMER
PULSED AIR FLOW CLEANS BAGS
FILTER BAG
BAG SUPPORT
DUST-LADEN GAS
COLLECTED DUST
SOLIDS

Figure A.21
SCHEMATIC OF TYPICAL FABRIC FILTER (BAGHOUSE) COLLECTOR WITH PULSED COMPRESSED AIR CLEANING CYCLE
(Adapted from American Industrial Hygiene Association, 1968.)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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Because of the lower gas-to-cloth ratios of the shaker and reverse-air types, they usually are massive units in comparison to the pulse jet type, and require hundreds of bags.

## Fugitive Emissions

Several operations and storage areas at the proposed plant are potential fugitive dust sources. These operations include unloading raw materials such as gypsum, coal, wet clay, wet limestone, silica sand, and iron ore, and the transfer and storage of these materials. However, because of their high moisture content, fugitive dust emissions from limestone, wet clay, and silica sand operations are not expected to be significant. Generally atmospheric emissions from coal, gypsum, dried clay, and iron ore unloading, transfer, and storage operations will be controlled by providing baghouse dust collectors and/or dust suppression water sprays as required at transfer points.

Several raw material storage piles will also have potential for fugitive dust emissions: the limestone storage pile, dry clay pile, coal pile, gypsum pile, iron ore pile, and silica sand pile. Since all these storage piles (except the limestone pile) will be covered, dust emissions essentially will be eliminated. In addition, the limestone storage piles will be provided with extensive water spray systems which will maintain the piles in a wet state at all times and thereby eliminate dust emissions.

In summary, the potential impacts due to fugitive dust emissions have been mitigated by designing the process with baghouses and water sprays at specific points and covers for the stockpiles of the drier materials.

## NOISE

### Construction

The activities of land clearing, grading, pile driving, construction of buildings, and erection of process equipment will be performed with the machinery previously described in Table A.1. The construction activities have been estimated to generate the levels of noise shown in Figure A.22 (see Noise section of Appendix B, Baseline, for an explanation of noise levels). These levels will be attenuated by natural barriers, trees, and vegetation, as well as by distance. In order to lessen the impact of noise on nearby residents, the following actions are planned:

1. Priority will be given to using equipment with noise suppression devices, complying with the Walsh-Healy Act and Occupational Safety and Health Administration (OSHA) regulations. Reduced noise levels for workers will also mean reduced ambient levels.
2. Most construction activities will be restricted to daylight hours to reduce impacts on residents during normal sleep periods.
3. The vegetation along the east and north will be retained to attenuate noise levels.

Since it is anticipated that the plant's construction period will coincide with the U.S. Army Corps of Engineers ship channel project, the plant will not be the only active noise source. Every effort will be made to minimize the overlap of the two projects in terms of peak noise generation.

### Operations

The proposed cement plant will generate noise from its various unit operations, materials handling, raw materials delivery and product shipping. The major sources will include:

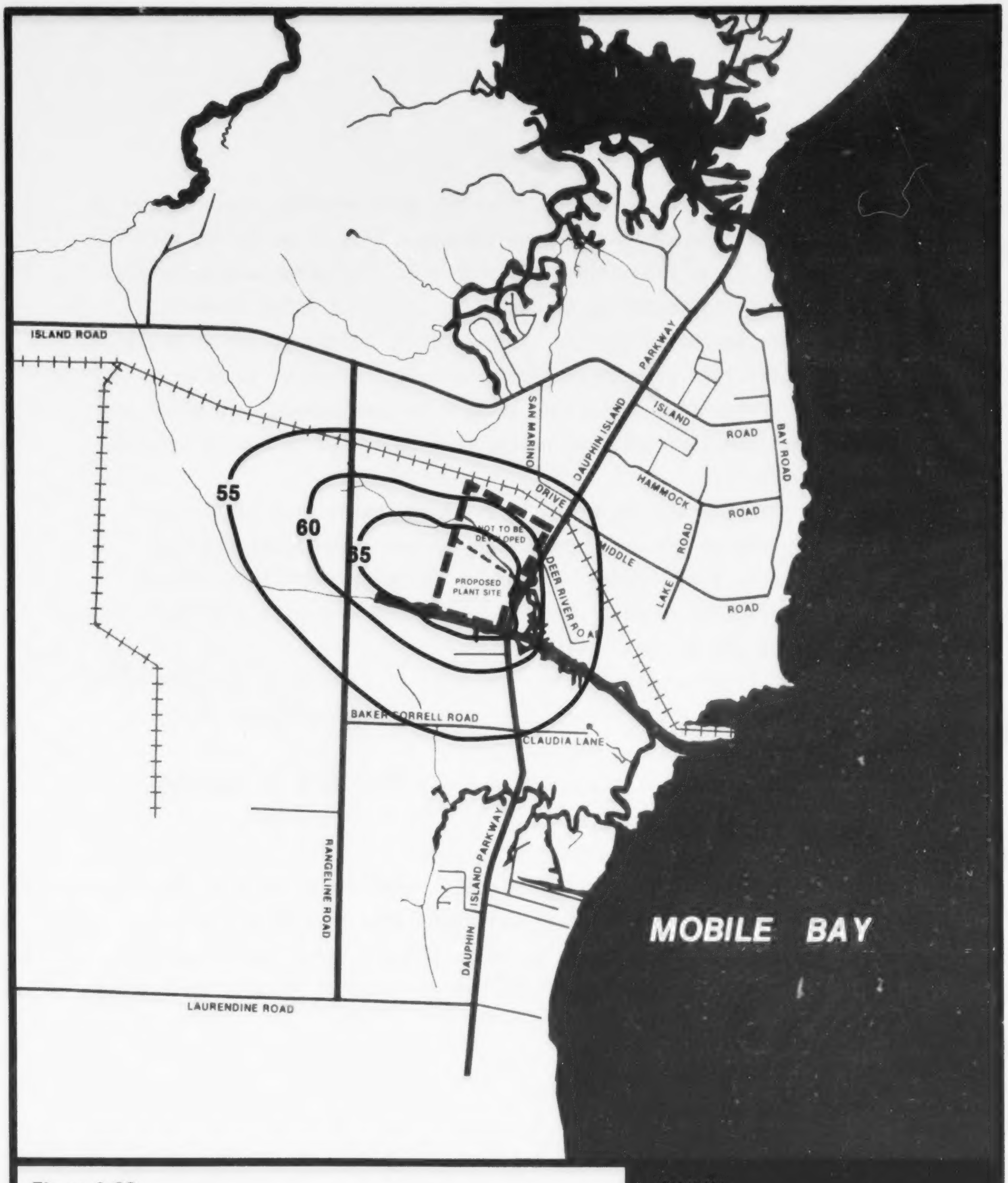
ISLAND ROAD
SAN MARINO DRIVE
DAUPHIN ISLAND PARKWAY
ISLAND ROAD
HAMMOCK ROAD
MIDDLE ROAD
LAKE ROAD
BAY ROAD
55
60
65
NOT TO BE DEVELOPED
PROPOSED PLANT SITE
DEER RIVER ROAD
BAKER SORRELL ROAD
CLAUDIA LANE
RANGELINE ROAD
DAUPHIN ISLAND PARKWAY
LAURENDINE ROAD
MOBILE BAY
0 0.5 1
SCALE IN KILOMETERS
N

**Figure A.22**
**EQUAL SOUND LEVEL ($L_{dn}$) CONTOURS DUE TO WORST CASE CONSTRUCTION ACTIVITIES FROM THE PROPOSED PLANT ONLY**

**SOURCE: Environmental Science and Engineering, Inc., 1977.**

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1. Tug and barge traffic
2. Material handling and conveying equipment
3. Raw grinding mills
4. Coal dryer and grinder
5. Clay dryer
6. Kilns
7. Finish grinding mills
8. Railroad
9. Trucks
10. Compressors, fans, and machine shops.

The proposed action at the Ideal Basic Industries property at Theodore Industrial Park will involve these noise sources. The precise noise characteristics of the proposed plant are not known, but a reasonable approximation was made from the results of a noise study conducted at another cement plant which uses the dry process and has roughly one-third the capacity of the planned Ideal Basic Industries facility. Since the major elements of each plant are distributed over nearly equal areas, the values obtained at the smaller plant, once adjusted for the size differential, could be used for predictions of noise levels at the larger plant.

Figure A.23 shows the isopleths of noise levels estimated to be generated by the proposed cement plant. These levels reflect attenuating effects from vegetation in the area. Other sources of noise such as ship channel traffic, road traffic, and surrounding industries are not included in the values shown.

The sound levels are highest in the off-site areas to the south and west because of the lack of vegetation to shield these areas. The critical area is located immediately south of the site along the bank of the existing barge canal. The impact of these sound levels is discussed in Appendix C, Impacts.

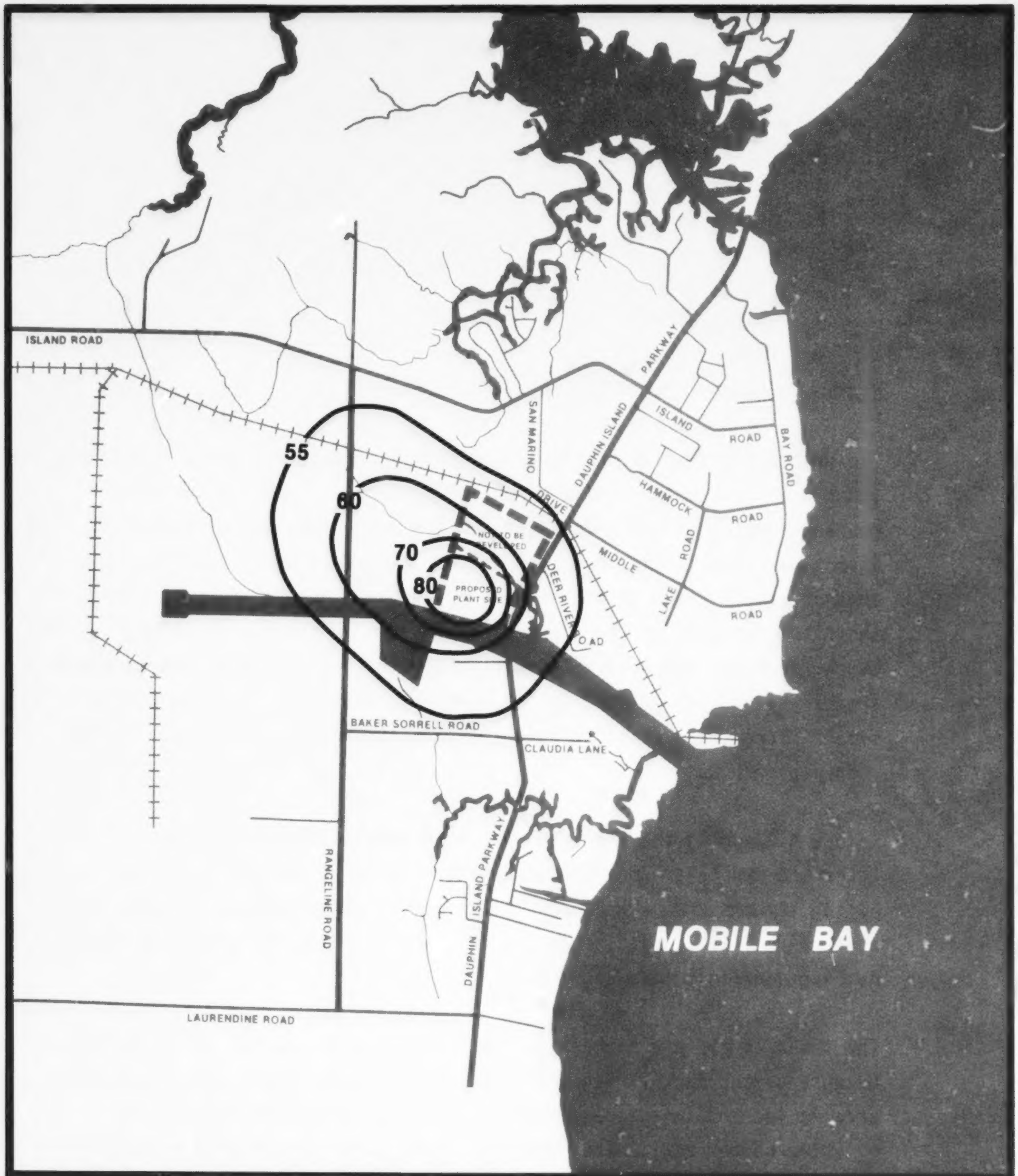
ISLAND ROAD
55
60
70
80
NOT TO BE DEVELOPED
PROPOSED PLANT SITE
SAN MARINO
DRIVE
DAUPHIN ISLAND PARKWAY
ISLAND ROAD
BAY ROAD
HAMMOCK ROAD
MIDDLE
LAKE ROAD
ROAD
DEER RIVER ROAD
BAKER SORRELL ROAD
CLAUDIA LANE
RANGELINE ROAD
DAUPHIN ISLAND PARKWAY
MOBILE BAY
LAURENDINE ROAD

**Figure A.23**
EQUAL SOUND LEVEL ($L_{dn}$) CONTOURS DUE TO PLANT OPERATIONS ONLY

0 0.5 1
SCALE IN KILOMETERS

SOURCE: Environmental Science and Engineering, Inc., 1977.

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In order to lessen these estimated noise levels, Ideal Basic Industries will:

1. Enclose most of the process equipment (except for parts of the kilns as required for heat dissipation);
2. Review the recommendations of their design consultant concerning possible design changes that will generate less noise by utilizing latest techniques in equipment design and plant layout.
3. Retain a 90-meter (300-foot) wide greenbelt along its eastern boundary and not develop the forested area north of the facility site;
4. Locate roads and railroads as far away as practicable from residential areas.
5. Locate a 20-meter (65-foot) high dead storage limestone pile to the east of the facility.

In summary, the cement plant will increase the ambient noise level by its construction and operation activities. Levels are estimated to be highest in the areas immediately south and west of the plant site. Ideal Basic Industries is taking the steps described above to mitigate the estimated impacts.

## SOLID WASTE

### Construction

The generation of solid wastes during the construction phase of the proposed project will involve land clearing, dredging, grading, construction, and final cleanup.

### Land Clearing

The land clearing aspects will involve about three months of cutting and removing the existing trees and stumps. It is expected that approximately 20 hectares (50 acres) will be clear-cut. Because the area was timbered in 1974, few large trees remain. Typically, the trees are less than 8 centimeters (3 inches) in diameter. Three types of disposal methods are under consideration for partial use and combination or exclusive use: chipping and mulching, controlled burning, and landfilling.

The vegetative wastes will be chipped on site and used for mulch along the buffer strip between the disturbed and non-disturbed areas. This method would be helpful in stabilizing the soil to lessen erosion and in revegetating the land.

The contractor will apply for a burning permit from the Mobile County Board of Health in order to utilize an air-blower type pit burner for disposing of the wood wastes. This device is basically an outdoor furnace that combusts the vegetation in a more efficient manner and thus creates less smoke and particulate matter than "open burning." A pit is dug and the wastes are piled in it and burned. The pit is encircled by a manifold which blows air down into the burning material and which thus provides more oxygen for the combustion process. Burning would be conducted under favorable atmospheric conditions that would tend to disperse the smoke. In addition, a fire watch would be maintained during the burning period.

The other method of disposal is reducing the waste to an acceptable size for burial at the Irvington Landfill. This method requires access to the site by vehicles to haul the wastes to the landfill.

The actual use of any one or all of these methods would be based on the practical application of each method within the time constraints of the construction schedule. All the methods are believed to be environmentally acceptable. However, the chipping and mulching is the most desirable since it does not create localized smoke conditions or utilize a portion of a landfill that could be best used for burial of higher-priority wastes.

## Dredging

The plans for the ship channel allow for a side slope that extends approximately 60 meters (200 feet) inland from the channel's toe. Assuming a conservative case of a 12-meter (40-foot) depth below msl, the amount of dredging required for the docking facility at the cement plant has been estimated to be 500,000 cubic meters (650,000 cubic yards). It is anticipated that permission will be given by the Alabama State Docks Department to place this dredged material in one of the two approved spoil disposal areas to be established for the ship channel project--a land site southwest of the area or the spoil island in Mobile Bay. The construction schedules of both the Corps ship channel project and the cement plant involve similar time frames (start at the end of 1978).

## Grading

Grading the site location for surface drainage to the north and construction of a berm for the stormwater catchment area will balance the cut and fill so that disposal of excess material will not be necessary.

## Construction and Final Clean-up

The construction wastes generated from erection and final site clean-up will be brought to the Irvington Landfill by a private contractor. These wastes are expected to be quantities of lumber, concrete, brick, cardboard, and metal scraps.

## Operations

The cement manufacturing operation will produce approximately 1,043 metric tons (1,150 tons) of solid wastes per year. Table A.7 shows the various sources of these wastes and their estimated quantities and disposal methods.

A local disposal firm will be contracted for hauling most of the wastes from the plant site to the Irvington Landfill. On-site industrial landfilling is not proposed by Ideal Basic Industries; therefore, all solid wastes that cannot be recycled into the process or sold to a reclaiming operation (such as a dealer in scrap metal or waste oils) must be disposed at this landfill. Each process area recognized to be a source of solid waste will use a trash bin system for storing the wastes until removed by the contractor.

The kilns and their suspension preheaters are refractory-lined to retain heat. During the course of normal operations, portions of the refractory brick lining will deteriorate. These sections must be cleaned and re-bricked; the debris is estimated to be a total of 667 metric tons (736 tons) of refractory bricks per year.

The packhouse produces bags of cement at the rate of 50 bags per minute. When an upset or bag breakage occurs, the cement product will be reclaimed and the paper bags discarded. This operation has been estimated to contribute about 14 metric tons (16 tons) of paper waste per year.

Table A.7. Solid Waste Disposal

| Area | Type | Quantity<br>Metric Tons/ Year | Quantity<br>(Tons/Year) | Quantity<br>Kilograms/ Day | Quantity<br>(Pounds/ Day*) | Disposal Method |
|---|---|---|---|---|---|---|
| Kilns | Refractory Bricks | 667 | (736) | 1,830 | (4,030) | Off-site landfill |
| Packhouse | Broken Paper Bags | 14 | (16) | 40 | (90) | Off-site landfill |
| Office | Papers, Lunchroom Trash | 11 | (12) | 30 | (60) | Off-site landfill |
| Maintenance | Rags, Oil, Grease, Solvents | 34 | (37) | 90 | (200) | Off-site landfill |
| Raw Mill | Rejected Material | 166 | (183) | 450 | (1,000) | Off-site landfill |
| Coal Mill | Metals | 82 | (91) | 220 | (500) | Off-site landfill |
| Settling Basin | Sediment | 68 | (75) | 190 | (410) | Off-site landfill or recycled into process |
| TOTAL | | 1,043 | (1,150) | 2,850 | (6,290) | |

* Based on 365 days per year.

Source: Environmental Science and Engineering, Inc., 1977.

The plant will have approximately 20 office employees and will provide a lunchroom for all of the 135 employees. Typical paper wastes generated from these two areas are estimated to be 11 metric tons (12 tons) per year.

The maintenance or shop area will have various metal wastes such as broken pieces of equipment, scraps from welding or other repairs, used grinding balls, empty drums, etc. It is planned that these will be sold to a local scrap metal dealer for recycling. Waste oils will be sold to refineries for processing. A small portion of the metal scraps and oily wastes eventually will be found in the other solid waste from the shop area such as rags, solvents, grease, wood scraps, cardboard, broken bags from the baghouses, and paper. These are expected to comprise about 34 metric tons (37 tons) per year to be removed by the disposal contractor.

The raw mill prepares raw materials, including limestone, clay, sand, and iron ore, for the manufacture of cement. These materials will be quarry-run materials but may contain foreign pieces of rocks, wood, and metal, which will be separated from the raw materials. This source is estimated to contribute 166 metric tons (183 tons) per year of non-usable solid wastes, which will be hauled to the landfill for disposal.

Foreign materials found in the coal are removed by use of an electromagnet and mechanical separators. The solid wastes from the coal mills are estimated to be 82 metric tons (91 tons) per year.

The plant will have a catchment area for general stormwater runoff and a settling basin for industrial wastewaters to reduce the solids loadings. The suspended solids that settle to the bottom of the basins must be removed at regular intervals to avoid reducing the detention capacities of the basins. Based upon influent and effluent estimates, about 68 metric tons (75 tons) of sediment should be removed each year. The sediment will be surface dried and if possible re-introduced into the process. However, this material might have to be taken to the landfill.

In summary, the majority of solid wastes generated from construction and operation of the cement plant will be taken to the Irvington Landfill for disposal. It is anticipated that the land clearing wastes may be disposed on site (chipping or burning) and the dredged materials taken to an approved disposal area. Excluding the construction wastes, metal scraps, and waste oils that will be recycled, there will be about 1,043 metric tons (1,150 tons) of wastes disposed each year.

## WATER UTILIZATION AND DISPOSAL

### Water Usage Requirements

The proposed plant has five major demands for water--process cooling, sanitary facilities, truck and car wash and other floor washes, the dust suppression sprays, and finish mills/preheaters cooling sprays.

The process cooling system will be non-contact and will service the various operations such as the raw mills, kilns, finish grinding mills, etc. A cooling tower will be incorporated into the cooling system, and two cycles of concentration will be allowed in the cooling system prior to cooling tower blowdown. The total flow anticipated is approximately 0.8 cubic meters per minute (200 gpm) with about a 0.28 cubic meters per minute (75 gpm) make-up requirement due to evaporation and cooling system discharge. Based on a 24-hour per day operation, approximately 409 cubic meters per day (108,000 gpd) will be required for cooling water make-up.

The projected sanitary water demand for the estimated 135 employees is 20 cubic meters per day (5,000 gpd) to use in toilets, sinks, and showers. The showers are intended for routine use of the employees.

The projected demand for the truck and car wash and for the floor washes is 6.6 cubic meters per day (1,750 gpd) and 17.7 cubic meters per day (4,680 gpd), respectively. This is a total demand of 24 cubic meters per day (6,430 gpd).

The projected demand for the cooling systems of the finish mills and preheaters is 436 cubic meters per day (115,200 gpd). The estimated fugitive dust suppression system will use 190 cubic meters per day (50,000 gpd).

Therefore, the total water demand is expected to be roughly 1,080 cubic meters per day (285,000 gpd). This demand will be supplied with potable water from the Board of Water and Sewer Commissioners of the City of

Mobile distribution system in the Theodore Industrial Park. Table A.8 presents the results of an analysis of the finished water for this water supply.

## Industrial Wastewater

The four sources of industrial wastewater will be the raw material stockpiles, the process cooling water system, the truck and car wash and floor washes, and the runoff from the aboveground fuel oil storage tank. The discharges from these sources will be combined in the settling basins prior to final discharge to the ship channel (see Figure A.24).

The outside raw material storage areas (limestone and clay) will be diked to capture the runoff from the uncovered piles. Table A.9 gives the specific sizes of each storage area and their effective areas. The average yearly rainfall for the Mobile area is 1,700 millimeters (67 inches), which would produce an average daily flow from the piles of 166 cubic meters (43,800 gallons). A 10-year, 24-hour rainfall, which is about 200 millimeters (9 inches), in the Mobile area, will produce a pile runoff water volume of about 8 million liters (2.1 million gallons), not considering any loss from filtration and evaporation.

In order to evaluate the characteristics of the runoff from the raw material storage piles, simple leachate simulation tests and analyses were performed. The results for the separate leachates, which are shown in Table A.10, show a variation of pH of 7.2 to 9.0 for the limestone leachate and 5.1 to 6.3 for the clay leachate.

While the pH of the clay leachate is below the EPA-stipulated range of 6.0 to 9.0, the runoff volume from the clay stockpile constitutes only about 2 percent of the total stockpile runoff.

The results in Table A.10 also show that both the limestone and clay leachate have a high suspended solids content. However, settling tests performed on the limestone leachate indicated that a suspended solids

Table A.8. Typical Analysis of Water Supply to Mobile, Alabama (1969)

| Constituents | Concentrations* |
|---|---|
| Alkyl Benzene Sulfonate | .03 |
| Alkalinity (Total M.O.) | 14-18 |
| Antimony | <.004 |
| Arsenic | <.005 |
| Barium | .009 |
| Beryllium | <.00002 |
| Bismuth | <.002 |
| Boron | .06 |
| Cadmium | <.003 |
| Calcium | 10-12 |
| Carbonate | 6-8 |
| Chloride | 7-10 |
| Chromium | <.0004 |
| Cobalt | <.002 |
| Conductivity, Specific | 80 |
| Copper | .062 |
| Cyanide | <.005 |
| Extractable by Chloroform | .054 |
| Extractable by Alcohol | .108 |
| Fluoride | .7-1.1 |
| Hardness | 25-35 |
| Iron | .046 |
| Lead | <.03 |
| Magnesium | .3-.5 |
| Manganese | .002 |
| Molybdenum | <.0009 |
| Nickel | <.003 |
| Nitrate | .2 |
| pH | 8.5-9.0 |
| Potassium | .4 |
| Radium | <.1 pc/L |
| Radioactivity, Alpha | <.5 CPM |
| Radioactivity, Beta | 6.3 mmc/L |
| Selenium | <.003 |
| Silica | 3.1 |
| Silver | .002 |
| Sodium | 1.8-2.8 |
| Solids, Total | 43-62 |
| Sulfate | 7.8 |
| Tin | .001 |
| Uranium | .1±.1 ug/l |
| Vanadium | <.0009 |
| Zinc | <.03 |

*All concentrations in milligrams per liter except as noted.

Source: U.S. Geological Survey, 1969.

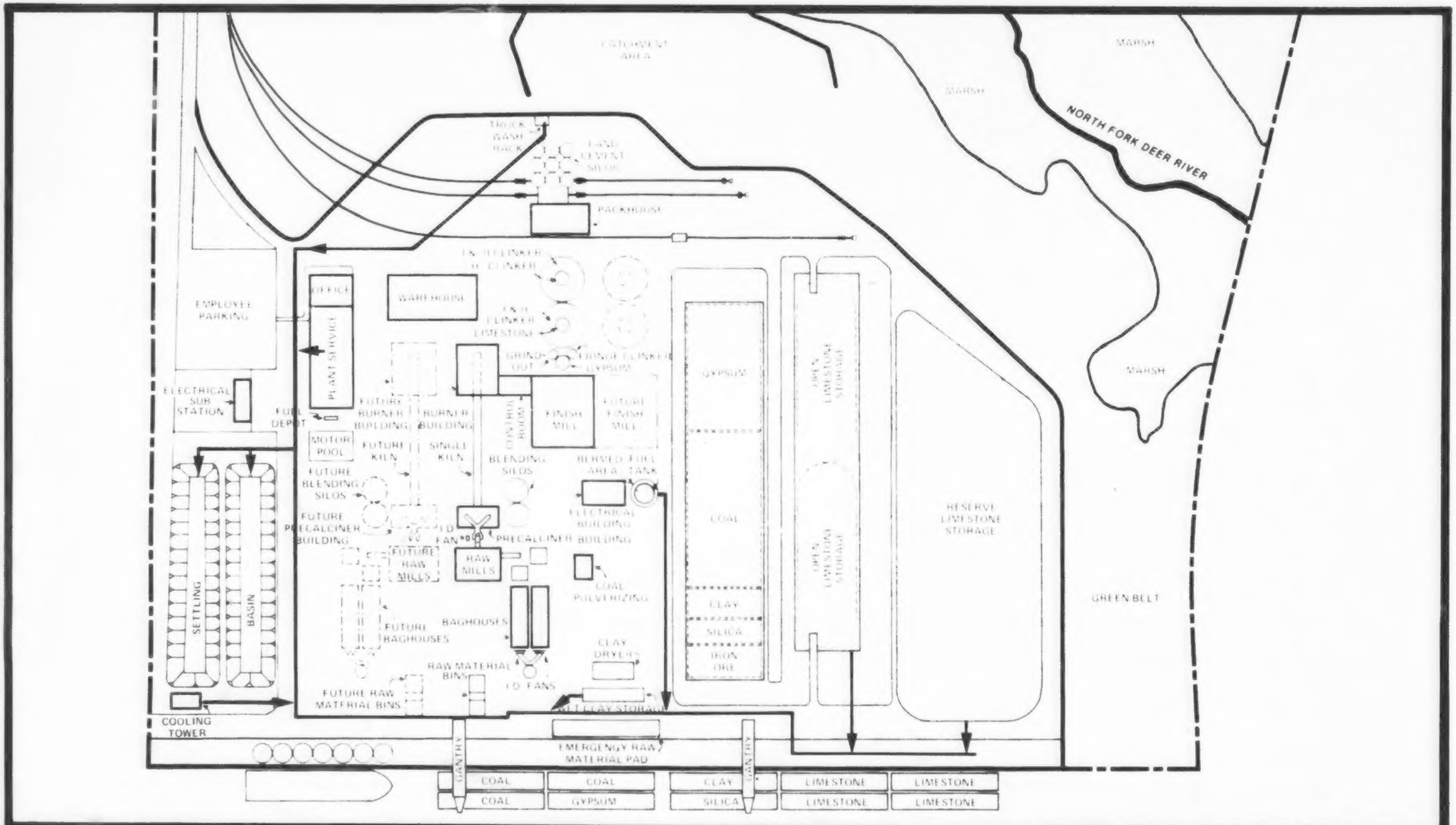
CATCHMENT AREA
MARSH
MARSH
MARSH
NORTH FORK DEER RIVER
GREEN BELT
TRUCK WASH RACK
CEMENT SILOS
PACKHOUSE
EMPLOYEE PARKING
OFFICE
PLANT SERVICE
WAREHOUSE
CLINKER
CLINKER
CLINKER
LIMESTONE
GRIND-OUT
GYPSUM
ELECTRICAL SUB STATION
FUEL DEPOT
MOTOR POOL
FUTURE BURNER BUILDING
BURNER BUILDING
CONTROL ROOM
FINISH MILL
FUTURE FINISH MILL
FUTURE KILN
SINGLE KILN
BLENDING SILOS
FUEL TANK
FUTURE BLENDING SILOS
FUTURE PRECALCINER BUILDING
I.D. FAN
PRECALCINER BUILDING
ELECTRICAL BUILDING
FUTURE RAW MILLS
RAW MILLS
COAL PULVERIZING
BAGHOUSES
FUTURE BAGHOUSES
CLAY DRYERS
RAW MATERIAL BINS
I.D. FANS
FUTURE RAW MATERIAL BINS
SETTLING
BASIN
COOLING TOWER
GANTRY
EMERGENCY RAW MATERIAL PAD
GYPSUM
COAL
CLAY
SILICA
IRON ORE
OPEN LIMESTONE STORAGE
OPEN LIMESTONE STORAGE
RESERVE LIMESTONE STORAGE
GANTRY
COAL
COAL
COAL
GYPSUM
CLAY
SILICA
LIMESTONE
LIMESTONE
LIMESTONE
LIMESTONE

Figure A.24
SOURCES OF INDUSTRIAL WASTEWATER

SOURCE: Environmental Science and Engineering, Inc., 1977.

Reproduced from best available copy.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED CEMENT MANUFACTURING PLANT THEODORE INDUSTRIAL PARK MOBILE, ALABAMA**

Table A.9. Storage Pile Characteristics

| Material | Length | | Width | | Height | | Actual Area | |
|---|---|---|---|---|---|---|---|---|
| | meters | (feet) | meters | (feet) | meters | (feet) | sq. meters | (sq. feet) |
| Limestone (active) | 230 | (760) | 52 | (170) | 20 | (65) | 12,000 | (129,200) |
| Limestone (reserve) | 248* | (813)* | 98 | (320) | 20 | (65) | 24,200 | (260,200) |
| Clay | 39 | (129) | 20* | (67)* | 11 | (36) | 800 | (8,640) |

*Effective dimension since area is not rectangular.

Source: Ideal Basic Industries, 1977.

Table A.10. Preliminary Leachate Study Results

| | Sample No. | pH | SS (mg/1) | DS (mg/1) | SO$_4$ (mg/1) | BOD (mg/1) | COD (mg/1) | Cd (ug/1) | Cu (ug/1) | Cr (ug/1) | Pb (ug/1) | Ag (ug/1) | Ni (ug/1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8132 | 8.0 | 1,590.0 | 60.0 | 25.0 | 3.6 | 22.0 | -- | -- | -- | -- | -- | -- |
| First Source Limestone | 8135 | 8.2 | 964.0 | 166.0 | 19.0 | 2.7 | 17.0 | -- | -- | -- | -- | -- | -- |
| | 8138 | 8.3 | 556.0 | 237.0 | 9.9 | 3.2 | 17.0 | -- | -- | -- | -- | -- | -- |
| | 8141* | -- | -- | -- | -- | -- | -- | <0.5 | 9.6 | <1.0 | <3.0 | 6.9 | 11.0 |
| | 8143 | 9.0 | <5.0 | 94.0 | 22.0 | 3.6 | 19.0 | -- | -- | -- | -- | -- | -- |
| Second Source Limestone | 8144 | 7.5 | <5.0 | 54.0 | 14.0 | 1.5 | 15.0 | -- | -- | -- | -- | -- | -- |
| | 8145 | 7.2 | <5.0 | 52.0 | 14.0 | 1.9 | 11.0 | -- | -- | -- | -- | -- | -- |
| | 8146* | -- | -- | -- | -- | -- | -- | <0.5 | 5.9 | 1.9 | <3.0 | 9.6 | 3.5 |
| | 8147 | -- | 152.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Limestone* | 8148 | -- | 252.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | 8149 | -- | 54.0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Clay* | 8150 | 5.1 | 77.0 | 28.0 | <5.0 | 1.8 | 7.9 | <0.5 | 5.9 | 3.3 | <3.0 | 5.1 | 6.5 |
| | 8151 | 6.3 | 3,180.0 | 2,220.0 | 1,600.0 | 1.7 | 8.4 | <0.5 | 13.0 | 3.3 | 72.0 | 18.0 | 5.0 |

*Effluent after settling

Source: Environmental Science and Engineering, Inc., 1977.

reduction of 85 percent is achievable. Settling tests were not performed on the clay leachate since the clay stockpile runoff contribution is minor.

The results of the metals analyses indicate generally low metal concentrations, with the exception of a lead concentration of 72 ug/l that was found in the clay leachate. However, this concentration will be reduced to less than 1.5 ug/l in the combined runoff.

A toxicity test, in which basic fish bioassays were performed, was conducted to determine the nature of the raw material stockpile runoff. The toxicity test solution was a mixture of the clay and limestone leachates with water. The areas of the clay and limestone stockpiles, as determined from preliminary engineering construction designs, were 653 square meters (7,030 square feet) and 16,300 square meters (175,000 square feet), respectively. These estimates of the areas (which are somewhat more conservative than the areas shown in Table A.9) were used to determine the proportions for mixing the leachates to create the test solution.

The results of analyses of the test solution presented in Table A.11 show only one constituent--iron--with a significantly high concentration. This concentration of iron, which was expected because of the nature of the stockpiles, will be reduced through dilution and settling in the settling basin.

In the toxicity test, no fish died as a result of exposure to the test solution for the 96-hour test period. Furthermore, the test solution represented the worst possible condition that might exist using limestone and clay leachates, since in actuality the runoff from the stockpiles will be diluted with other wastewaters of generally low strength, such as cooling tower blowdown.

EPA may permit the effluent discharge into the ship channel with stipulations of TSS and pH as defined in the effluent guidelines. These

Table A.11. Results of Toxicity Test Solution Analyses

| Conductance (umhos/cm) | pH (Sta. unit) | BOD (mg/l) | COD (mg/l) | Cd (ug/l) | Cu (ug/l) | Fe (ug/l) | Pb (ug/l) | Mn (ug/l) | Hg (ug/l) | Ni (ug/l) |
|---|---|---|---|---|---|---|---|---|---|---|
| 355 | 7.6 | 4.4 | 71.5 | 0.36 | <1.0 | 2,729 | <0.8 | <55 | <0.080 | 6.9 |

Source: Environmental Science and Engineering, Inc., 1977.

stipulations are 50 mg/l of TSS and a pH within the range of 6.0 to 9.0 (see the Draft NPDES Permit in the Permit and Approval section of the Summary Document).

The cooling system is a non-contact type with a daily make-up rate of 409 cubic meters (108,000 gallons). Approximately 67 percent of the make-up is required because of evaporation loss, and the remaining 33 percent is used to maintain desired coolant quality in the cooling tower. The cooling tower will blow down approximately 140 cubic meters per day (36,000 gpd) to the settling basin to undergo cooling and treatment for reduction of solids and temperature prior to being discharged to the ship channel.

Based on the analytical results of the potable water of the City of Mobile, a concentration of as much as three times the original levels could occur in the cooling system due to evaporation without degrading the water quality to unacceptable levels. Therefore, the cooling tower blowdown will serve to dilute other wastewaters discharging to the basin.

Based on common practices, it is anticipated that the non-contact cooling water system will require use of an algicide and scale inhibitor. The specific types to be used are still under investigation; however, Ideal Basic Industries has agreed to obtain EPA's approval prior to use of any additive.

The truck and car wash will contribute approximately 6.6 cubic meters per day (1,750 gpd) of wastewater to the basin. An additional 17.7 cubic meters per day (4,680 gpd) of floor wash wastewater will be routed to the basin.

The primary pollutant of the wastewater generated by the truck and car wash and the floor washes is expected to be suspended solids. This should not interfere with the treatment efficiency of the basin because of the small volume relative to the cooling tower blowdown. In addition, this wastewater, like the stockpile runoff, will be non-toxic since the solids will consist of the same materials.

The above-ground fuel oil tank will have a containment berm surrounding it in case of a spill or tank failure. During typical rainfall events, this berm will catch runoff from the roof of the tank and direct rainfall. This water must be drained to maintain containment capacities; the water will be routed to the settling basins for mixing with other wastewater. The estimated average daily flow from the berm is about 0.7 cubic meters (190 gallons) after deducting for evaporation. The runoff volume from a 10-year, 24-hour storm would be about 35 cubic meters (9,150 gallons).

Table A.12 summarizes the wastewater flows discharged to the settling basin prior to discharge to the ship channel. The proposed settling basin, with an average depth of 2 meters (8 feet), has a capacity of about 16 million liters (4.2 million gallons). This capacity is sufficient to contain the wastewater flow, including the stockpile stormwater runoff volume for the 10-year, 24-hour storm, and thus to meet the EPA storage capacity requirements.

The basin will discharge continuously into the ship channel. The average discharge will be 341 cubic meters per day (90,100 gpd). This accounts for direct rainfall on the basin and for evaporation losses from the basin.

Due to the dilution of the higher strength wastewaters by the cooling system discharge and the settling occurring in the basin, the discharge to the ship channel will meet the requirements of 50 mg/l or less of TSS and of a pH within the range of 6.0 to 9.0. Because of the properly designed settling basin, no water quality problems should occur.

The settling basin will be divided into two sections; one will remain on-line while the other is cleaned of settled solids. The basin will

Table A.12. Wastewater Discharge to Settling Basin

| Source | Discharge | |
|---|---|---|
| | Cubic Meters/Day | Gallons/Day |
| Runoff from limestone and clay stockpiles | 165.8<br>(8,029.9) | 43,800<br>(2,121,500)* |
| Cooling system discharge | 136.3 | 36,000 |
| Trucks and car wash, floor washes | 24.3 | 6,430 |
| Fuel tank berm | 0.7<br>(34.6)* | 190<br>(9,150)* |
| Total Influent | 327.1<br>(8,225.1)† | 86,420<br>(2,173,080)† |
| Direct Rainfall on Pond | 43.1<br>(2,087.4)* | 11,400<br>(551,485)* |
| Evaporation from Pond | 29.2 | 7,720 |
| Difference | 13.9 | 3,680 |
| Total Discharge | 341.0<br>(10,312.5)† | 90,100<br>(2,724,565)† |

* Runoff volume for 10-year, 24-hour storm of 9 inches

† Total discharge including runoff volume for 10-year, 24-hour storm of 9 inches

Source: Environmental Science and Engineering, Inc., 1977.

have to be cleaned approximately once every four months to remove roughly 50 cubic meters (60 cubic yards) of sediment. As mentioned in the Solid Waste section, the sediment, if it cannot be recycled into the process, will be hauled to the Irvington Landfill for disposal.

## General Stormwater Runoff

The general stormwater runoff from the facility site will drain north by natural flow patterns and drainage ditches. This flow will then enter a 2-hectare (5-acre) catchment area which is enclosed by a 0.9- to 1.5-meter (3- to 5-foot) high earth berm. Water will be discharged to the freshwater marsh; the catchment area is designed to be drained to maintain its storage capacity.

The discharge from the bermed area will be approximately 910 cubic meters per day (240,300 gpd) based on the average annual rainfall of 1,700 millimeters (67 inches), a plant site runoff coefficient of 0.887, and a plant site area of 22 hectares (54 acres).

A 10-year, 1-hour rainfall at the plant site is about 76 millimeters (3 inches) (U.S. Soil Conservation Service, 1973). The runoff volume for this storm will be approximately 15 million liters (3.9 million gallons). The bermed grassy area, with a storage capacity of 12 million liters (3.3 million gallons), will retain the runoff for about the first 50 minutes of the storm.

Two basins will be built in series in the catchment area to increase the efficiency of sediment control. The discharge from the bermed area will undergo further natural treatment in the marsh system prior to entering the ship channel.

## Summary of Wastewater Flows

Figure A.25 is a schematic of wastewater flow at the proposed Ideal Basic Industries cement plant.

The two wastewater discharges to surface waters from the proposed plant will be from the industrial wastewater settling basin and from the general stormwater catchment area. These flows will be approximately 341 cubic meters per day (90,100 gpd) and 910 cubic meters per day (240,300 gpd), respectively.

## Sewage System

During construction, the sanitary system for the workers will be portable toilets serviced by a local contractor. Disposal of wastes will be approved in advance by the Mobile County Board of Health.

The projected sanitary wasteloads from the approximately 135 employees will be 20 cubic meters per day (5,000 gpd).

The Board of Water and Sewer Commissioners of the City of Mobile has just completed a lift station at the intersection of the North Fork Deer River and Dauphin Island Parkway. This lift station will take the sewage to the new McDuffie Island treatment plant.

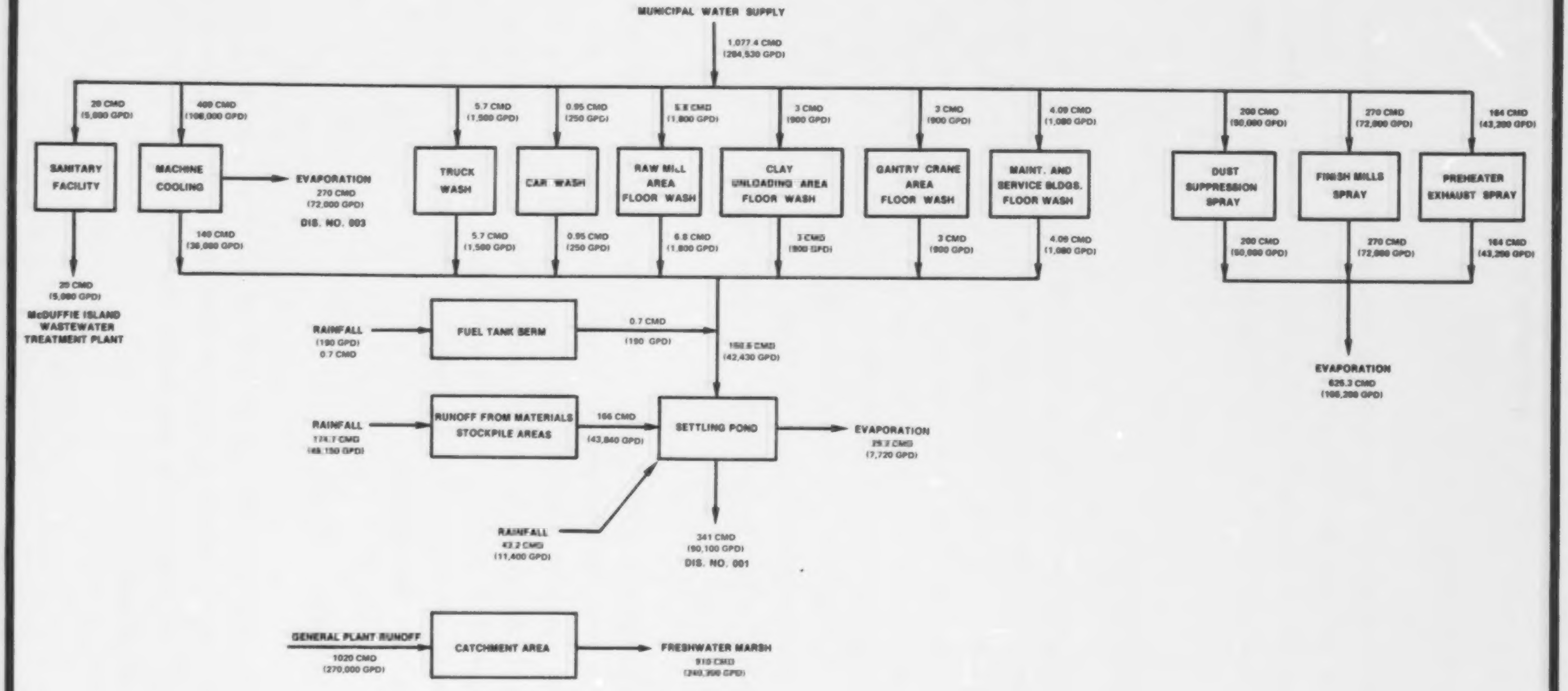
MUNICIPAL WATER SUPPLY
1,077.4 CMD
(284,530 GPD)
20 CMD
(5,080 GPD)
SANITARY FACILITY
20 CMD
(5,080 GPD)
McDUFFIE ISLAND WASTEWATER TREATMENT PLANT
400 CMD
(108,000 GPD)
MACHINE COOLING
EVAPORATION
270 CMD
(72,000 GPD)
DIS. NO. 003
140 CMD
(36,000 GPD)
5.7 CMD
(1,500 GPD)
TRUCK WASH
5.7 CMD
(1,500 GPD)
0.95 CMD
(250 GPD)
CAR WASH
0.95 CMD
(250 GPD)
6.8 CMD
(1,800 GPD)
RAW MILL AREA FLOOR WASH
6.8 CMD
(1,800 GPD)
3 CMD
(900 GPD)
CLAY UNLOADING AREA FLOOR WASH
3 CMD
(900 GPD)
3 CMD
(900 GPD)
GANTRY CRANE AREA FLOOR WASH
3 CMD
(900 GPD)
4.09 CMD
(1,080 GPD)
MAINT. AND SERVICE BLDGS. FLOOR WASH
4.09 CMD
(1,080 GPD)
200 CMD
(50,000 GPD)
DUST SUPPRESSION SPRAY
200 CMD
(50,000 GPD)
270 CMD
(72,000 GPD)
FINISH MILLS SPRAY
270 CMD
(72,000 GPD)
164 CMD
(43,200 GPD)
PREHEATER EXHAUST SPRAY
164 CMD
(43,200 GPD)
EVAPORATION
626.3 CMD
(166,200 GPD)
RAINFALL
(190 GPD)
0.7 CMD
FUEL TANK BERM
0.7 CMD
(190 GPD)
160.6 CMD
(42,430 GPD)
RAINFALL
174.7 CMD
(46,150 GPD)
RUNOFF FROM MATERIALS STOCKPILE AREAS
166 CMD
(43,840 GPD)
SETTLING POND
EVAPORATION
29.2 CMD
(7,720 GPD)
RAINFALL
43.2 CMD
(11,400 GPD)
341 CMD
(90,100 GPD)
DIS. NO. 001
GENERAL PLANT RUNOFF
1020 CMD
(270,000 GPD)
CATCHMENT AREA
FRESHWATER MARSH
910 CMD
(240,300 GPD)

Figure A.25
SCHEMATIC OF WASTEWATER FLOW

(ENGLISH UNITS IN PARENTHESES)

SOURCE: Environmental Science and Engineering, Inc., 1978.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED CEMENT MANUFACTURING**
**PLANT THEODORE INDUSTRIAL PARK**
**MOBILE, ALABAMA**

## ENVIRONMENTAL SAFEGUARDS

In the proposed design for the cement plant, certain environmental impacts during construction and operation were anticipated. Therefore, several mitigating actions were incorporated in the design plans. These were generally presented in the preceding sections, but are summarized below.

### Stormwater Runoff Control

To reduce the potential for deterioration of existing water quality in the ship channel and the North Fork Deer River, a stormwater runoff catchment area with two basins will be built as soon as possible for use during the construction period. The existing drainage and surface grading will be utilized to bring the runoff into the grassy bermed area [about 2 hectares (15 acres)] just between the freshwater marsh and the actual facility site. During operations, this catchment area also will serve as the best management plan for controlling the cement plant's stormwater runoff prior to discharge into the freshwater marsh of the North Fork Deer River.

Another erosion control will be the use of temporary berms to facilitate ponding and to slow the movement of runoff. Berms of hay or dirt will be constructed whenever practical to reduce the solids loading to the basins. This technique also will be used during the construction of the roadway, bridge, and railroad trestle since the runoff from this area (west-northwest) will generally go directly into the freshwater marsh and the North Fork Deer River.

### Industrial Wastewater Control

The wastewater settling basins will also be built as soon as possible to assist in controlling runoff during construction. However, since the existing and final grade is to the north, the main priority will be completing the general catchment area.

During plant operations, the wastewater settling basin will provide adequate treatment to meet the effluent requirements of U.S. EPA and the Alabama Water Improvement Commission.

## Process Air Emissions

The 62 sources of particulate matter emissions will be controlled by the best available technology--baghouses of 99 percent collection efficiency. Sulfur dioxide emissions will be limited by the use of low sulfur coal (1.5 percent maximum) and reduced by the chemical reaction with the alkaline materials in the manufacturing process.

## Fugitive Dust Controls

In the accessible work areas and along the access roadway, the main construction contractor will provide and routinely use water tank trucks with sprays. These will be utilized whenever practical to reduce the dust emissions.

During operations, the fugitive dust will be controlled by water sprays on open stockpiles and the materials handling system. In addition, coal and all raw materials except limestone and wet clay, will be stored in covered structures with dust control facilities.

## Noise Controls

The heavy construction equipment, such as pile drivers and compressors, will use available noise suppression equipment and will normally be scheduled to operate during daylight hours in order to lessen the noise impacts on local residents. The plant's design is being analyzed to suggest techniques to reduce noise from various process components. The greenbelt and other non-developed areas of the property, as well as the storage piles, will act to reduce noise emissions to the surrounding area.

## Burning Controls

Disposal of the vegetative wastes from land clearing will involve chipping, burning, and landfilling. The contractor will apply to the Mobile County Board of Health for a burning permit. Preliminary indications from the county air pollution staff are that burning could be acceptable if conducted according to specific restrictions that would prevent occurrence of a localized air pollution problem. Typically the burning must be performed under the following conditions:

1. Not causing a localized smoke problem;
2. Burning only during favorable air dispersion conditions; and
3. Coordination of activities with the local fire marshal.

The contractor will use an air-blower type pit burner. As explained in the Solid Waste section, this type of burning has better combustion efficiencies and less smoke and therefore is preferable from an air pollution standpoint. The burning will be continuously supervised and performed quickly to lessen the possibility of nuisances.

## Fuel Oil Spills

All above-ground fuel storage tanks will be encircled by earthen berms designed to hold 100 percent of their storage capacity. If a spill does occur, it will probably be very small, and removal of contaminated soil will not be necessary. However, if a large spill occurs, the Mobile County Board of Health will be notified for specific permission to take disposal actions.

## Solid Wastes

Other than the land clearing wastes already mentioned, the rest of the construction debris and most of the operational wastes will be taken to the Irvington Landfill for burial. This site is described in Appendix B, Baseline, as the closest approved site that will accept construction and operation wastes.

## Preservation of Natural Communities

The existing ecological communities will not be disturbed except within the required right-of-way for the access road and railroad spur and in the general facility area. It is intended that there will be minimum disturbance in the North Fork Deer River and its wetlands and the area north of the river will not be physically disturbed or developed.

## Archaeological/Historical Measures

The area has been surveyed and obvious archaeological or historical sites were not found. In case a possible site is uncovered, the Alabama Historical Commission will be notified immediately. Work will be stopped in that specific area until the commission gives its approval to resume operations.

## Local Community Aspects

Based on the history of previous construction projects, the majority of construction workers will be from the local area, and substantial money ($10,000,000) should be spent in local purchases of material.

The plant will be operated by employees from the present plant in Mobile and thus will not create stress on available housing and other public services and facilities.

## PERMITS AND APPROVALS REQUIRED

The construction and operation of the cement plant and of the limestone quarry must meet the compliance requirements of various environmental agencies. The environmental permitting and approval requirements for the construction and operation of the cement plant are presented in Table A.13. The emission or effluent requirements of these agencies are presented within the applicable sections of this appendix (Air Quality, Noise, Water Resources, etc).

Table A.13. Environmental Permits and Approval Requirements

| Parameter | Agency | Requirements |
|---|---|---|
| Air Emissions | Mobile County Board of Health | Permit to construct and permit to operate; technical and administrative portions of the Prevention of Significant Deterioration (PSD) Program. Permit for open burning. |
| | Alabama Air Pollution Control Commission | Permit to construct and permit to operate; technical and administrative portions of the PSD Program. |
| | U.S. Environmental Protection Agency | Final approval of PSD permit. |
| Wastewater Discharge | Alabama Water Improvement Commission | Issuance of letter of approval before construction, and waste discharge permit after construction completed. Certification of all COE permits. |
| | U.S. Environmental Protection Agency | National Pollution Discharge Elimination System (NPDES) permit. |
| | U.S. Army Corps of Engineers | Permit required for construction of discharge outlet in Theodore Ship Channel. |

Table A.13. Environmental Permits and Approval Requirements (Continued, page 2 of 3)

| Parameter | Agency | Requirements |
|---|---|---|
| Stormwater Runoff Control | U.S. Environmental Protection Agency | NPDES permit required for discharge to wetlands. |
| | Alabama Water Improvement Commission | No permit required. Must use "Best Management Practices." |
| Solid Waste | Mobile County Board of Health | No permit required but must approve of types of waste to be disposed in landfill. |
| | Alabama Health Department | No permit required; but approval for specific types of waste through Mobile County Board of Health. |
| | U.S. Environmental Protection Agency | No permit required; requirements under Resource Conservation and Recovery Act of 1976; works through state agency. |

Table A.13. Environmental Permits and Approval Requirements (Continued, page 3 of 3)

| Parameter | Agency | Requirements |
|---|---|---|
| Docking Facility | U.S. Army Corps of Engineers | Dredge and fill permit; permit for construction. |
| | Alabama State Docks | Permit for construction and approval for spoil disposal. |
| | Alabama Water Improvement Commission | Certification of dredging application to Corps. |
| Roadway and Railroad Trestle Construction in Wetlands | U.S. Army Corps of Engineers | Fill permit for roadway across North Fork Deer River and marsh. |
| | U.S. Coast Guard | Permission to bridge North Fork Deer River.* |
| | Alabama Water Improvement Commission | Certification of applications to Corps. |

* If the U.S. Coast Guard is determined to have jurisdiction.

Source: Environmental Science and Engineering, Inc., 1978.

# QUARRY SITE

## LOCATION AND DEVELOPMENT

### EXISTING CONDITIONS

The proposed quarry site is located approximately 129 kilometers (80 miles) northeast of Mobile on the eastern banks of Alabama River in Monroe County (see Figure A.26). This 1,633-hectare (4,035-acre) tract of land will provide the limestone rock for the proposed cement plant operations. The property is approximately 5 kilometers (3 miles) southwest of the Stockton Road (Monroe County Road No. 1)-U.S. Highway 84 intersection (Perdue Hill Community) and about 23 kilometers (14 miles) down the Alabama River from the Claiborne Lock and Dam (see Figure A.27). The area generally is hilly with relief ranging from a base level of less than 3 meters (10 feet) above msl at the Alabama River to an altitude of nearly 60 meters (200 feet) along Marshalls Bluff.

Bluffs and outcrops occur along the western boundary of the property adjacent to the Alabama River. Relief moderates considerably to the east, as well as north and south of the site. Underlying the sand and gravel on the surface is a layer of limestone, which in many areas protrudes through the surface layer.

There are four large creeks on the proposed quarry site which flow into the Alabama River. They are shallow creeks which have sand and gravel bottoms and flow in a southwest direction. In descending order from north to south they are: McGirts Creek, Thompson Mill Creek (also known as Marshalls Creek), Hollinger Creek, and Randons Creek.

The property is composed of two main land tracts--land owned by Ideal and land leased to Ideal for mining (see Figure A.28). The northern

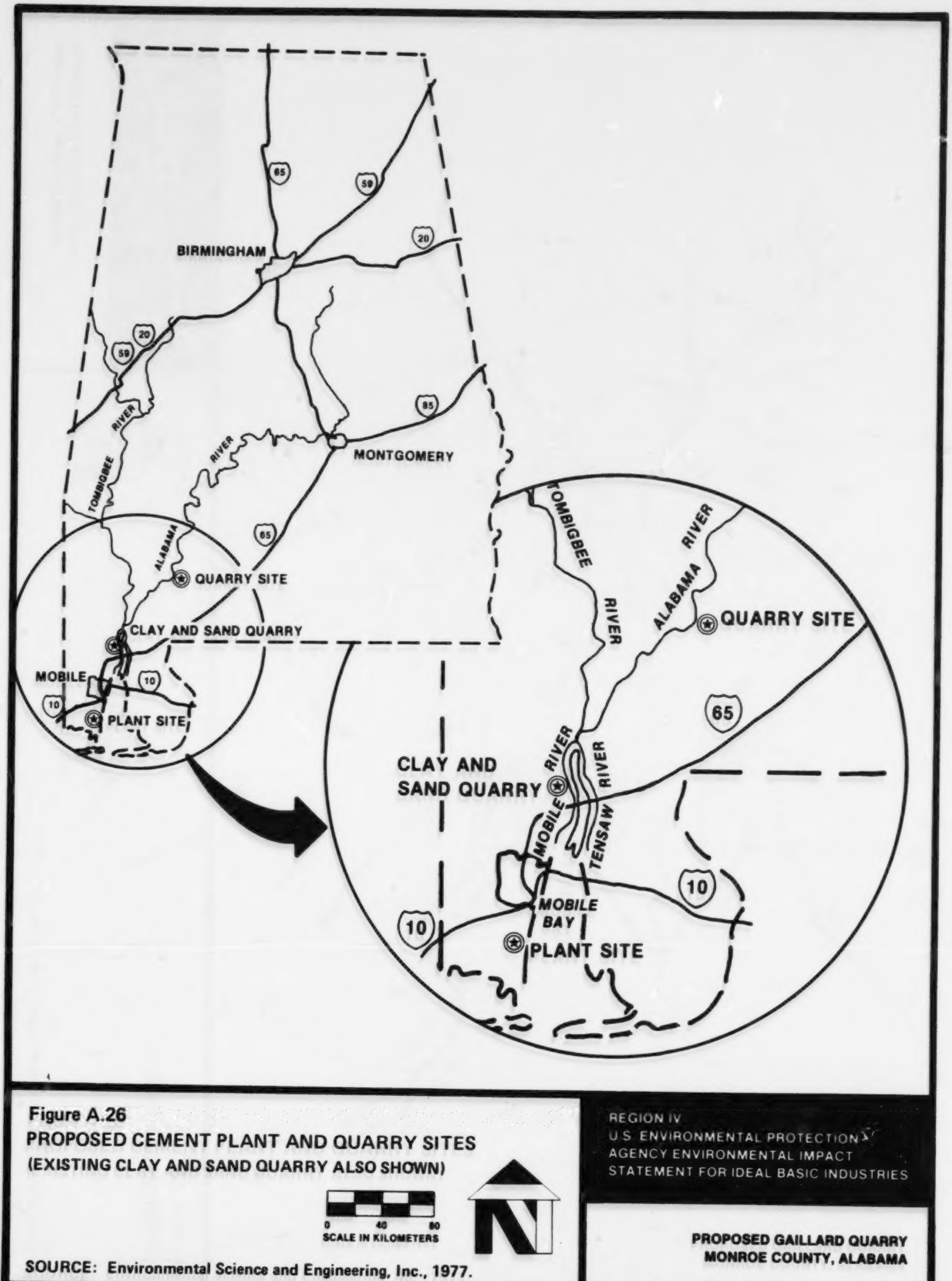
BIRMINGHAM
65
59
20
20
59
85
MONTGOMERY
TOMBIGBEE RIVER
ALABAMA RIVER
65
QUARRY SITE
CLAY AND SAND QUARRY
MOBILE
10
10
PLANT SITE
TOMBIGBEE RIVER
ALABAMA RIVER
QUARRY SITE
65
CLAY AND SAND QUARRY
MOBILE RIVER
TENSAW RIVER
10
MOBILE BAY
10
PLANT SITE

Figure A.26
PROPOSED CEMENT PLANT AND QUARRY SITES
(EXISTING CLAY AND SAND QUARRY ALSO SHOWN)

0 40 80
SCALE IN KILOMETERS
N

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

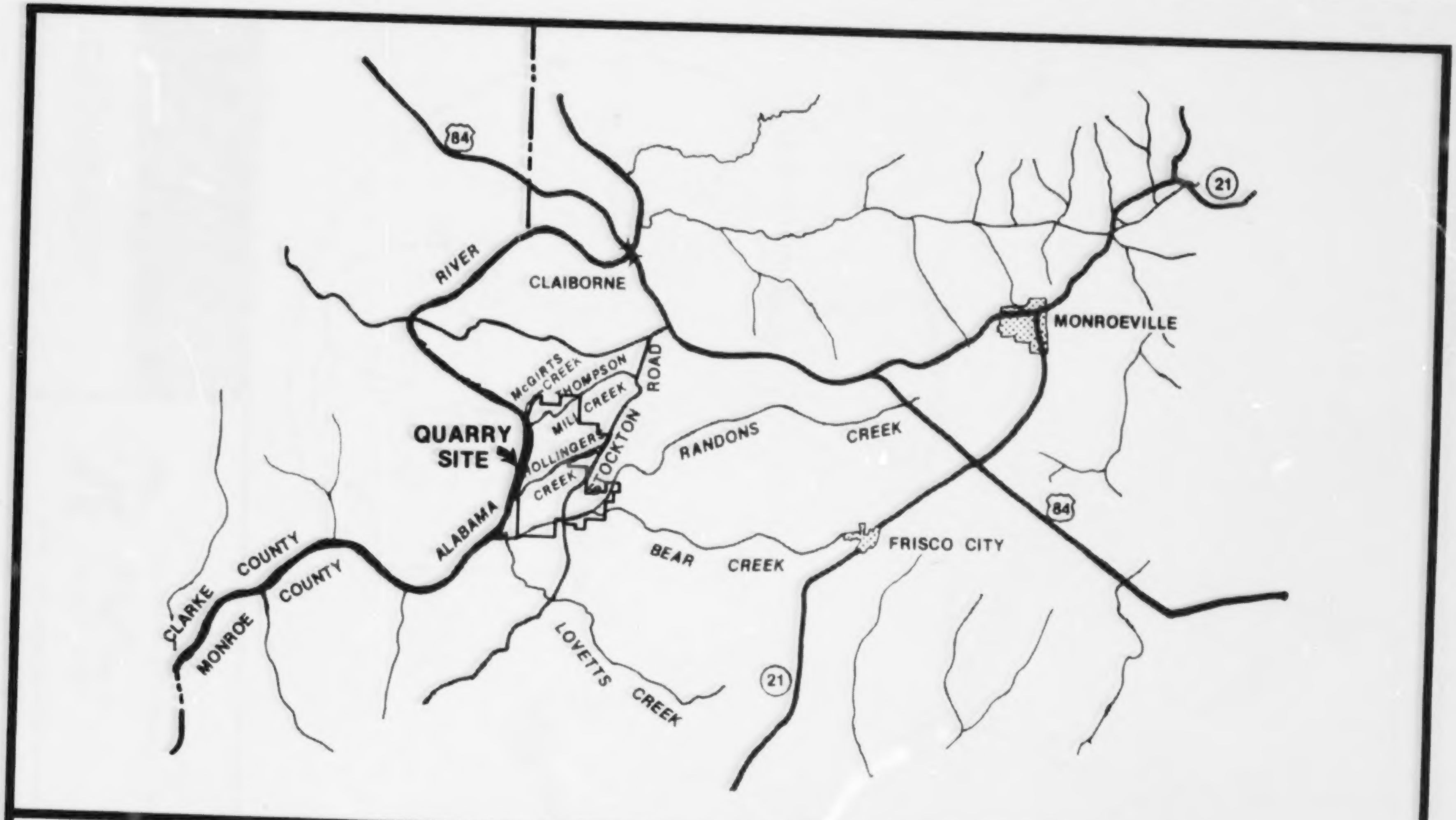
84
RIVER
CLAIBORNE
21
MONROEVILLE
McGIRTS CREEK
THOMPSON CREEK
MILL CREEK
HOLLINGERS CREEK
STOCKTON ROAD
QUARRY SITE
RANDONS CREEK
ALABAMA
CLARKE COUNTY
MONROE COUNTY
BEAR CREEK
FRISCO CITY
84
LOVETTS CREEK
21
0
5
10
SCALE IN KILOMETERS
N

Figure A.27
QUARRY SITE VICINITY

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

**PROPOSED GAILLARD QUARRY**
**MONROE COUNTY, ALABAMA**

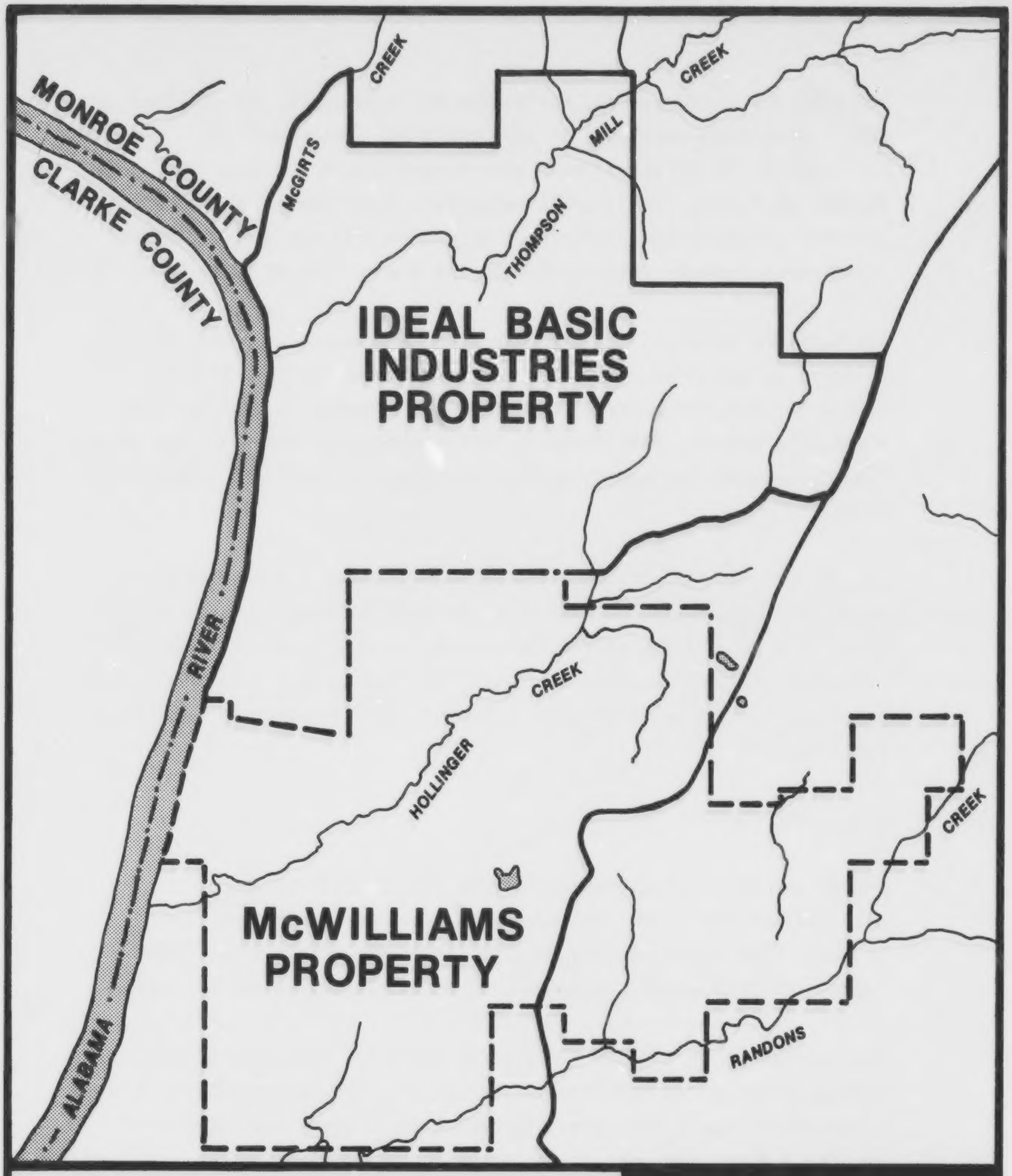
MONROE COUNTY
CLARKE COUNTY
McGIRTS CREEK
MILL CREEK
THOMPSON
IDEAL BASIC INDUSTRIES PROPERTY
HOLLINGER CREEK
ALABAMA RIVER
McWILLIAMS PROPERTY
RANDONS CREEK
0
0.5
1
SCALE IN KILOMETERS

Figure A.28
PROPERTY LINE, QUARRY SITE

SOURCE: Environmental Science and Engineering, Inc., 1977.

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739 hectares (1,826 acres), called the Gaillard tract, was obtained by Ideal in separate purchases in 1953 and 1959. The remaining 894 hectares (2,209 acres) have been leased from Mr. Howard McWilliams for mining rights. It is anticipated that approximately 80 percent of the total property [1,633 hectares (4,035 acres)] may be quarried by using present mining techniques over the quarry life of 40 to 50 years.

The Gaillard tract will be the main area to be quarried during the first 15 years of operation. A timber management plan for this land was initiated in 1969, and controlled hunting was allowed. A grazing lease, negotiated with Mr. McWilliams in 1976, allowed for timbering and establishing pastures throughout most of the property south of Thompson Mill Creek.

Figure A.29, an aerial view of the property, shows the conditions in June, 1977, after partial timbering and land clearing operations. Currently the primary use of the land is for pasture, and the reclamation practices have been planned to return the land to this use. For a more detailed description of present conditions (1977), refer to Appendix B, Baseline.

## SITE DEVELOPMENT

During the construction period, the main facility area at the quarry site will be developed. An access road will be constructed from Stockton Road (Monroe County Road No. 1) to the office site. Other roads will be developed as needed for access to active quarry areas.

Docking facilities will be constructed along the east bank of the Alabama River to accommodate four barges in a two-by-two pattern during limestone loading operations. Construction of these facilities will require a projection into the river of approximately 28 meters (90 feet) with a 5-meter (15-foot) minimum depth throughout its 194-meter (636-foot) length.

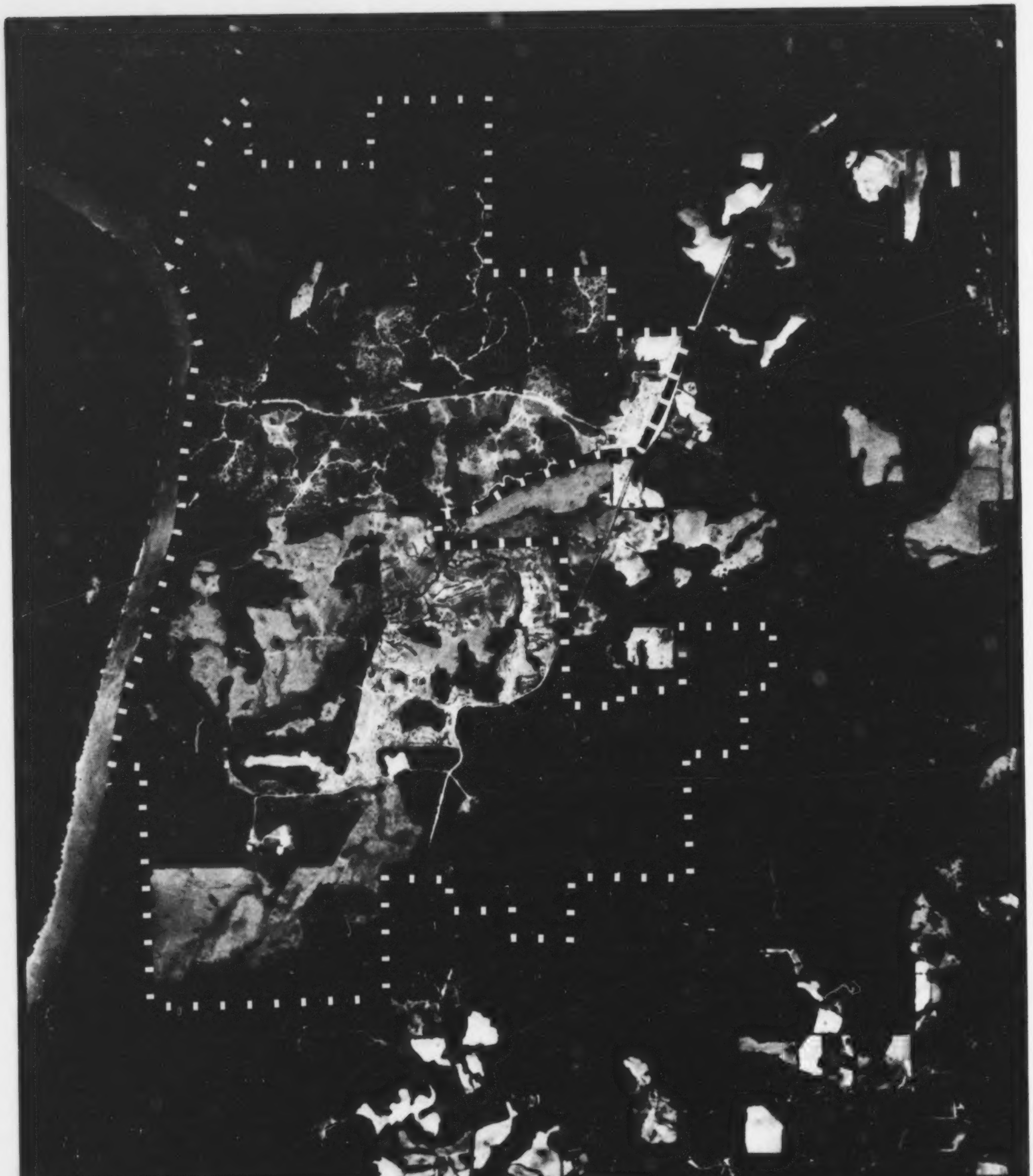
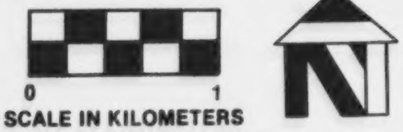


Figure A.29
AERIAL VIEW OF QUARRY SITE



SOURCE: Environmental Science and Engineering, Inc., 1977.

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Not all of the land at the quarry site can be worked economically because of deep overburden areas and steep slopes. Throughout the 50-year life of the quarry operation, 80 percent of the site will be actively quarried and reclaimed to pastureland.

In order to provide adequate pollution abatement controls for stormwater runoff, all active quarry areas, limestone stockpiles, and overburden storage areas will be drained to clarification basins. These basins will be developed from existing low areas, and water will be retained by earth dams. Wherever practical, overburden piles will be seeded to prevent excessive erosion and sediment problems.

The major improvements that will be made during the initial construction involve the following facilities:

1. Operation Office and Maintenance Building. This structure will house the operations office, a maintenance garage for service and repairs on quarry equipment, restrooms, a wash and change room, and an employee's lunchroom.

2. Mooring Facility. A free-standing mooring structure approximately 194 meters (636 feet) long will be built in the Alabama River to accommodate a tow of four barges each.

3. Loading Conveyor. A loading conveyor will be constructed to transport the limestone from the stockpile to the barges. This conveyor will be able to adjust its length and telescoping boot to allow loading of a barge regardless of the river stage fluctuation.

4. Crushers, Conveyors, and Stockpile. Each work face will be serviced by crushers for breaking oversized rock and a conveyor system for moving the rock to the storage area. The central limestone stockpile will be equipped with bottom feed hoppers to load out material to the barge loading conveyor.

5. Clarification Basins. South of the loading and storage area, two large clarification basins (Nos. 1 and 2) will be constructed by damming the outflow of natural depressions and will provide effective storage capacities for stormwater runoff of approximately 181,000 cubic meters (147 acre-feet) and 56,000 cubic meters (45 acre-feet), respectively. These basins will provide a sediment trap for all runoff from the disturbed quarry and limestone storage area. Another large basin [No. 5, with 176,000 cubic meters (143 acre-feet) storage capacity] will be created in Milkhouse Branch leading to Thompson Mill Creek. Since this area is devoid of limestone, the mining operation will work around it; separate portions will be clear-cut to provide for water storage capacity and overburden deposit areas. Two additional basins (Nos. 3 and 4) may be constructed at an indefinite time when the land north of the plant area is quarried. The locations of these clarification basins are illustrated in Figure A.30.

6. Roads. An all-weather access road will be constructed to the quarry office site from Stockton Road (Monroe County Road No. 1) located about 5 kilometers (3 miles) east. A bridge or culverts are planned over Coleman Branch and other drainageways.

7. Power. Electrical power will be supplied by either Alabama Electric Cooperative or Alabama Power Company. It is anticipated that power lines will be brought in along Monroe County Road No. 1 and then along the quarry access road. The utility company will provide 4.18 kilovolt service, and Ideal Basic Industries will provide the in-quarry lines and equipment to meet its needs (3 megawatts). The limestone breakers, belt conveyors, and traveling stackers will be operated by electricity. Auxiliary facilities, the office and maintenance buildings, will also be supplied with electrical lighting and power.

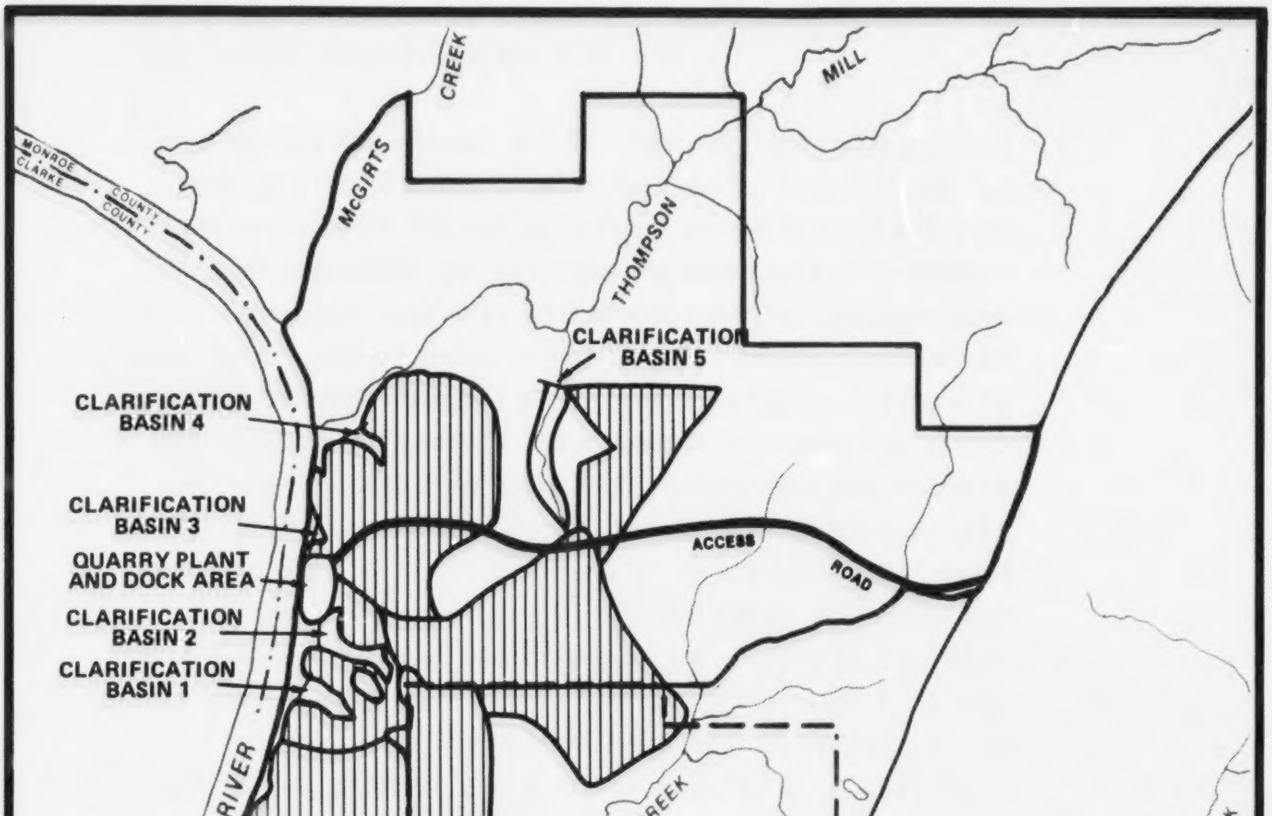
CREEK
MILL
MONROE COUNTY
CLARKE COUNTY
McGIRTS
THOMPSON
CLARIFICATION BASIN 5
CLARIFICATION BASIN 4
CLARIFICATION BASIN 3
QUARRY PLANT AND DOCK AREA
CLARIFICATION BASIN 2
CLARIFICATION BASIN 1
ACCESS ROAD
RIVER
ALABAMA
HOLLINGER CREEK
CREEK
BEAR
RANDONS
AREAS TO BE MINED

**Figure A.30**
**SITE DEVELOPMENT**
**(FIRST FIFTEEN YEARS)**

0 0.5 1
**SCALE IN KILOMETERS**

**SOURCE: Ideal Basic Industries, 1977.**

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8. Water and Sanitation. An on-site well for potable water, approximately 40 liters per minute (10 gpm), will be drilled, probably in the vicinity of the office building. A septic tank with a soil absorption field for sewage disposal will be constructed. Both facilities will be built to meet the requirements of the Monroe County Health Department.

9. Fuel Depot. A 38,000-liter (10,000-gallon) fuel oil tank and a 23,000 liter (6,000 gallon) gasoline tank will be installed to service on-site vehicles. Both tanks will be underground.

## CONSTRUCTION

The construction period is scheduled to start during the third quarter of 1978. Therefore, the project should begin in 1978 and finish in early 1980, for a total of 18 months. The estimated cost for the limestone quarry facility is $12 million (in 1977 dollars). Construction of the facility will employ an average of 133 workers, with a peak labor force of about 250 persons.

The construction plan will involve the same major phases as the cement plant: land clearing, grading, erection of structures and equipment, construction of docking facility, and equipment needs.

Approximately 40 hectares (100 acres) of the 1,633-hectare (4,035-acre) site will be cleared for the access road, main building, and stockpile area. The existing trees and undergrowth will be burned on-site and/or chipped for use as mulch to the extent practical. This phase is expected to take 3 months to complete. As soon as road construction will allow access of heavy earthmoving equipment, work will begin on the construction of the first two clarification basins. The work areas will be cleared to facilitate the placement of suitable embankment for the dam core.

When construction of the first clarification basin dam has progressed to the point where it can be used as a temporary sediment basin, clearing and earthwork will begin on the loading and storage site. Development of the loading and storage site will require grading a plateau at approximately 21 meters (70 feet) above msl. Design work by Brown & Root, Inc., may reduce the earthwork requirements for the initial excavation, but preliminary estimates indicate that approximately 570,000 cubic meters (750,000 cubic yards) of material will be moved. At least 190,000 cubic meters (250,000 cubic yards) of this material, which is expected to be overburden, will be permanently moved to a cleared area in the Milkhouse drainage basin. Additional overburden material will be used as fill in the construction of the clarification basin dams wherever suitable. The remaining portion of the initial excavation should be usable limestone which will be placed near Clarification Basin No. 2 or in other nearby locations so that it can be easily recovered for the initial shipments of limestone to the Mobile plant.

After the grading has been completed at the loading and storage site, the docking structures will be constructed at the waterfront. Figure A.31 shows the preliminary schematic layout for the loading and storage area at the quarry. Mooring dolphins will be placed in the river so that barges may be secured for loading. These structures will also provide support for the shuttle conveyor which will extend over the bank. A typical section of the waterfront development is shown in Figure A.32. Shoreline protection or stabilization improvements are not planned at the loading area since the existing river banks are very stable.

Ideal Basic Industries will begin operation of the quarry when the loading and storage facilities have been constructed and all equipment is operational. Three clarification basins will be complete and will function as the primary sedimentation control.

The overall schedule for construction is shown in Figure A.33, and the equipment required is listed in Table A.14.

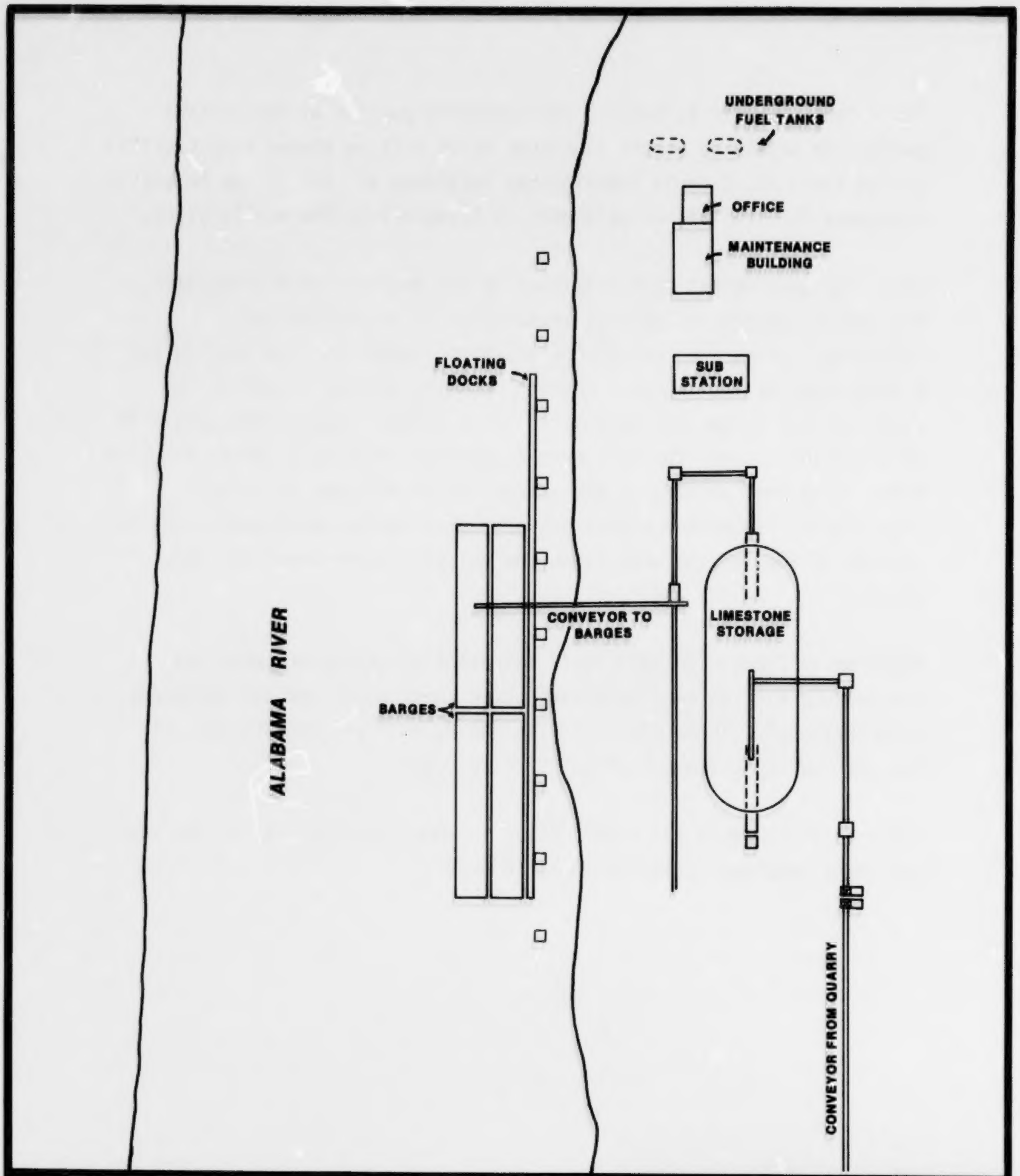
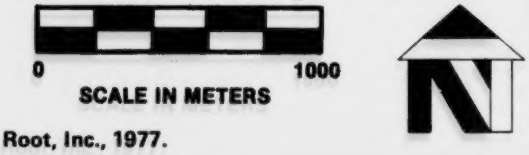

UNDERGROUND FUEL TANKS
OFFICE
MAINTENANCE BUILDING
SUB STATION
FLOATING DOCKS
CONVEYOR TO BARGES
LIMESTONE STORAGE
ALABAMA RIVER
BARGES
CONVEYOR FROM QUARRY

Figure A.31
SCHEMATIC LAYOUT OF WATERFRONT DEVELOPMENT


0
1000
SCALE IN METERS
N

SOURCE: Brown & Root, Inc., 1977.

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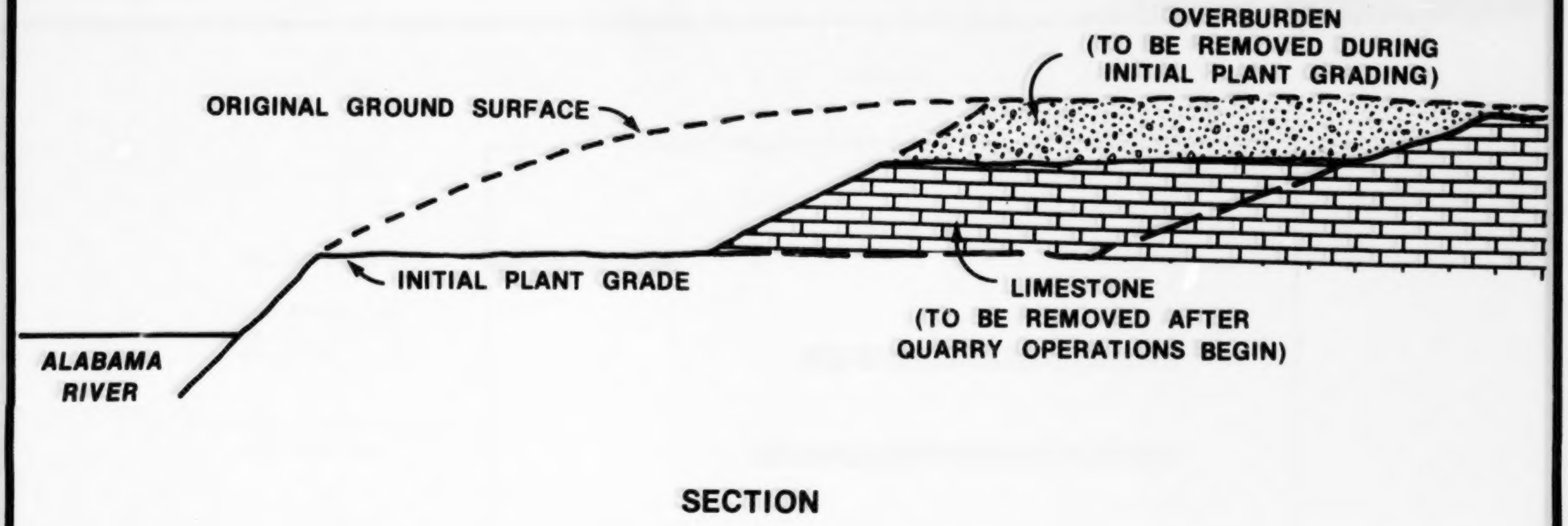
OVERBURDEN
(TO BE REMOVED DURING
INITIAL PLANT GRADING)
ORIGINAL GROUND SURFACE
INITIAL PLANT GRADE
LIMESTONE
(TO BE REMOVED AFTER
QUARRY OPERATIONS BEGIN)
ALABAMA
RIVER
SECTION

DRAWING NOT TO SCALE

Figure A.32
TYPICAL SECTION OF WATERFRONT DEVELOPMENT

SOURCE: Brown & Root, Inc., 1977.

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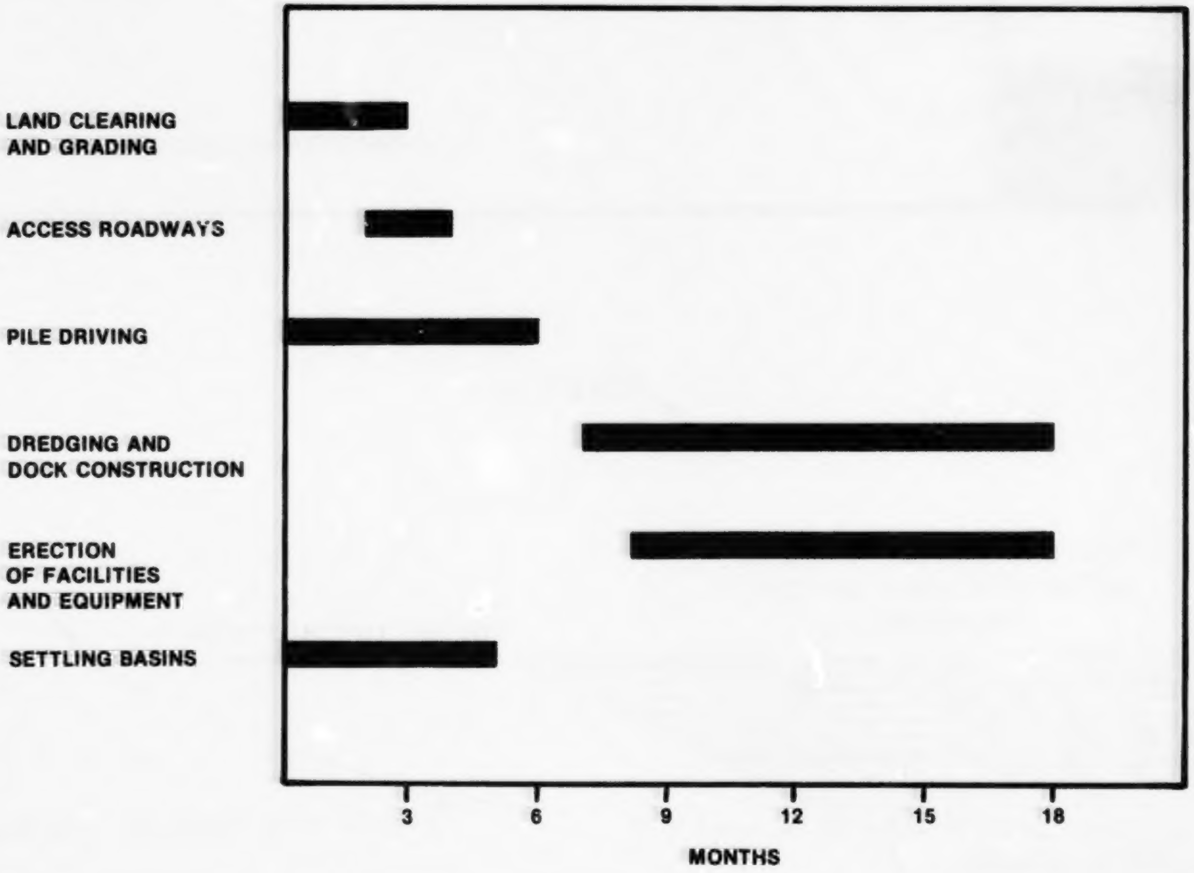

Figure A.33
SCHEDULE OF MAIN CONSTRUCTION TASKS

SOURCE: Brown & Root, Inc., 1977.

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Table A.14. Equipment Requirements

| Equipment | Project Duration (In Months) | | | | | |
|---|---|---|---|---|---|---|
| | 3 | 3 | 3 | 3 | 3 | 3 |
| **Earth Moving:** | | | | | | |
| Push Dozers | 4 | 2 | 1 | 1 | - | - |
| Scrapers | 4 | 2 | 1 | 1 | - | - |
| Graders | 4 | 2 | 1 | 1 | - | - |
| Loaders | 3 | 2 | 2 | 2 | 2 | 1 |
| Bulldozers | 4 | 2 | 2 | 2 | 2 | 1 |
| Carry-Alls | 3 | 2 | 1 | 1 | - | - |
| Rollers, Compactors | 2 | 2 | 1 | 1 | - | - |
| **Lifting:** | | | | | | |
| Light Cranes | 1 | 1 | 2 | 2 | 2 | 1 |
| Heavy Cranes | - | 1 | 1 | 1 | 1 | - |
| Side Booms | - | 2 | 2 | 2 | 2 | - |
| Cherry Pickers | 1 | 2 | 3 | 3 | 3 | 1 |
| Forklifts | 1 | 2 | 2 | 3 | 2 | 1 |
| **Miscellaneous Portable:** | | | | | | |
| D & G Welders | 2 | 5 | 10 | 10 | 10 | 5 |
| Air Compressors | 2 | 5 | 5 | 5 | 3 | 1 |
| Portable Generators | 1 | 2 | 2 | 2 | 1 | - |
| **Paving & Concrete:** | | | | | | |
| Backhoes | 3 | 3 | 5 | 5 | 5 | 2 |
| Portable Mixers | - | 2 | 2 | 2 | 2 | - |
| Ready-Mix Haulers | - | 5 | 10 | 10 | 5 | 1 |
| Vibrators | - | 3 | 5 | 5 | 3 | 1 |
| Rollers | - | - | 1 | 1 | 1 | 1 |
| Asphalt Distributors | - | - | 1 | 1 | 1 | 1 |
| Concrete Finishers | - | 2 | 5 | 5 | 3 | 1 |
| **Pile Drivers:** | - | 1 | 1 | 1 | 1 | - |
| **Transporters:** | | | | | | |
| Light Trucks | 3 | 5 | 5 | 5 | 5 | 5 |
| Heavy Trucks | 2 | 2 | 2 | 2 | 1 | 1 |
| Flatbeds, Low Boys - | 1 | 1 | 1 | 1 | 1 | 1 |
| Dump Trucks | 10 | 10 | 5 | 1 | 1 | - |

Source: Brown & Root, Inc., 1977.

## OPERATIONS

### QUARRYING SEQUENCE

The present plan is to work away from the limestone storage area. The areas most accessible are expected to be mined within the first 15 years. The development sequence has not been planned beyond this time due to the many possible variables to be considered. The planned development sequence and reserve estimates are discussed in the following paragraphs.

After the limestone excavated and stored during construction is consumed, production will shift to the areas around Clarification Basin No. 2 and then to the area between Basin No. 1 and No. 2. This area is shown in Figure A.34 as Area I.

There will be several active quarry areas with at least two active faces at any given time so that an area is in reserve for operations if excavation is not possible at the primary quarry face or area.

The portion of Area I between Basins No. 1 and No. 2 has limestone deposits, 0 to 15 meters (50 feet) thick, with an expected six-month production of limestone. The remaining portion on the north side of Basin No. 1 has approximately 115,000 cubic meters (150,000 cubic yards) of overburden (to be moved to Milkhouse Branch) and enough limestone to complete the first year's operation.

Attempts will be made to quarry first in areas with little overburden so that overburden will not have to be moved twice in the quarry operation. As the quarry progresses and overburden has to be stripped prior to limestone removal, the overburden can be placed in previously quarried areas. This "haulback" quarry operation will allow the permanent placement of stripped overburden on areas which have already been quarried. Topsoil will be stockpiled in a nearby sinkhole where it can be preserved until the replaced overburden has been brought up to grade. It will take up to approximately five years before topsoil is taken from

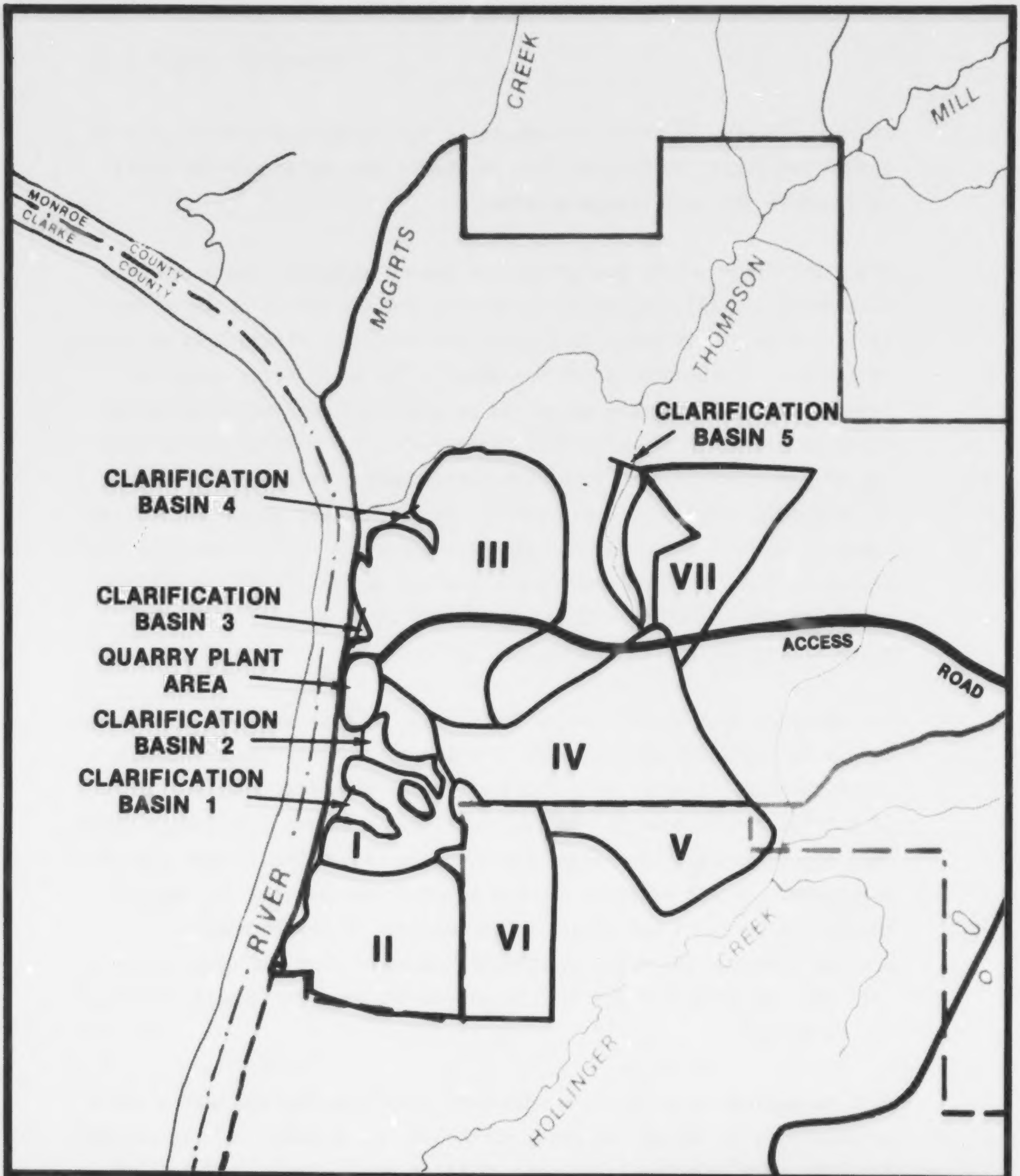
CREEK
MILL
MONROE
CLARKE
COUNTY
COUNTY
McGIRTS
THOMPSON
CLARIFICATION BASIN 5
CLARIFICATION BASIN 4
III
VII
CLARIFICATION BASIN 3
QUARRY PLANT AREA
ACCESS ROAD
CLARIFICATION BASIN 2
IV
CLARIFICATION BASIN 1
V
I
RIVER
CREEK
II
VI
HOLLINGER

**Figure A.34**
**MINING AREAS**
**(FIRST FIFTEEN YEARS)**

0 0.5 1
SCALE IN KILOMETERS

SOURCE: Environmental Science and Engineering, Inc., 1977.

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storage and used in final reclamation. The stockpiled topsoil will be graded and seeded so that it will be stable and resist erosion until utilized in the reclamation program.

After the first year's operation, the quarry expansion could continue into Areas II, III, IV, or VI since they are all fairly close to the initial Area I. In order to provide the necessary flexibility of mining operations, a sequence is not specified. The seven areas shown in Figure A.34 are the areas which can be mined most conveniently in the first 15 years. Production will require about 37 million metric tons (41 millon tons) of limestone (wet basis) during this period, whereas the expected quantities contained in the seven areas shown are significantly greater. Thus, not all of the areas shown will be mined by the fifteenth year, but the areas are presented to illustrate the maximum extent of the quarry operations that could be developed in 15 years given all the possible sequences.

The sequence that would require the storage of a minimum amount of overburden is the developing of Area II prior to the development of the other remaining areas. Area II is estimated to contain approximately 16 million metric tons (17 million tons) of limestone (wet basis), with only approximately 4.2 million cubic meters (5.5 million cubic yards) of overburden. These reserves are estimated to be adequate for approximately six years of operation. This sequence of development will provide adequate space for overburden placement from the other areas as they will be developed and will eliminate the need for double handling the material.

As alternatives to a southern expansion into Area II, the quarry could be developed to the north, east, northeast, or southeast of the storage facility. The expected boundaries of these areas, known as Areas III, IV, and VI, are shown in Figure A.34. Preliminary estimates indicate that there are more than 35 million metric tons (39 million tons) of limestone (wet basis) within these areas and that they represent at least 14 years of quarry production. However, these areas do contain much more overburden than Area II and will require the additional use of an overburden storage area in the Milkhouse Branch drainage area if substantial previously quarried areas are not available. Overburden will be deposited, contoured, and seeded for long-term or ultimate storage. As the quarry operations proceed, the "haul-back" reclamation process will be reinstituted. The stored material could be used for the grading and sloping of completed areas to establish final drainage patterns or could permanently remain in storage.

At least two additional clarification basins may be constructed if necessary to control adequately the drainage from the developed areas (shown as Basins Nos. 3 and 4 in Figure A.34). These two basins, or more if required, would be constructed in a manner similar to the two clarification basins south of the loading and storage facility.

## GENERAL OPERATIONS

The Gaillard quarry will be a conventional, open-type operation using dozers, front-end loaders, and scrapers in combination with crushing and loading equipment to handle the limestone and overburden material (see Figure A.35).

As determined by exploratory drilling, usable limestone deposits vary up to 29 meters (95 feet) thick and average about 9 meters (30 feet) throughout the property. Sinkholes, caverns, minor faulting, and quality variations complicate delineation and quarry operation. Additional exploratory drilling may be performed in advance of further quarry operation so that mining plans can be finalized for property development after the fifteenth year The thickness of the overburden, which is more than 34 meters (110 feet) in some areas, may render portions of these areas uneconomical to quarry. The ratio of overburden to limestone normally should not exceed 1 to 1 except for areas developed for access or "breakthroughs" to other areas.

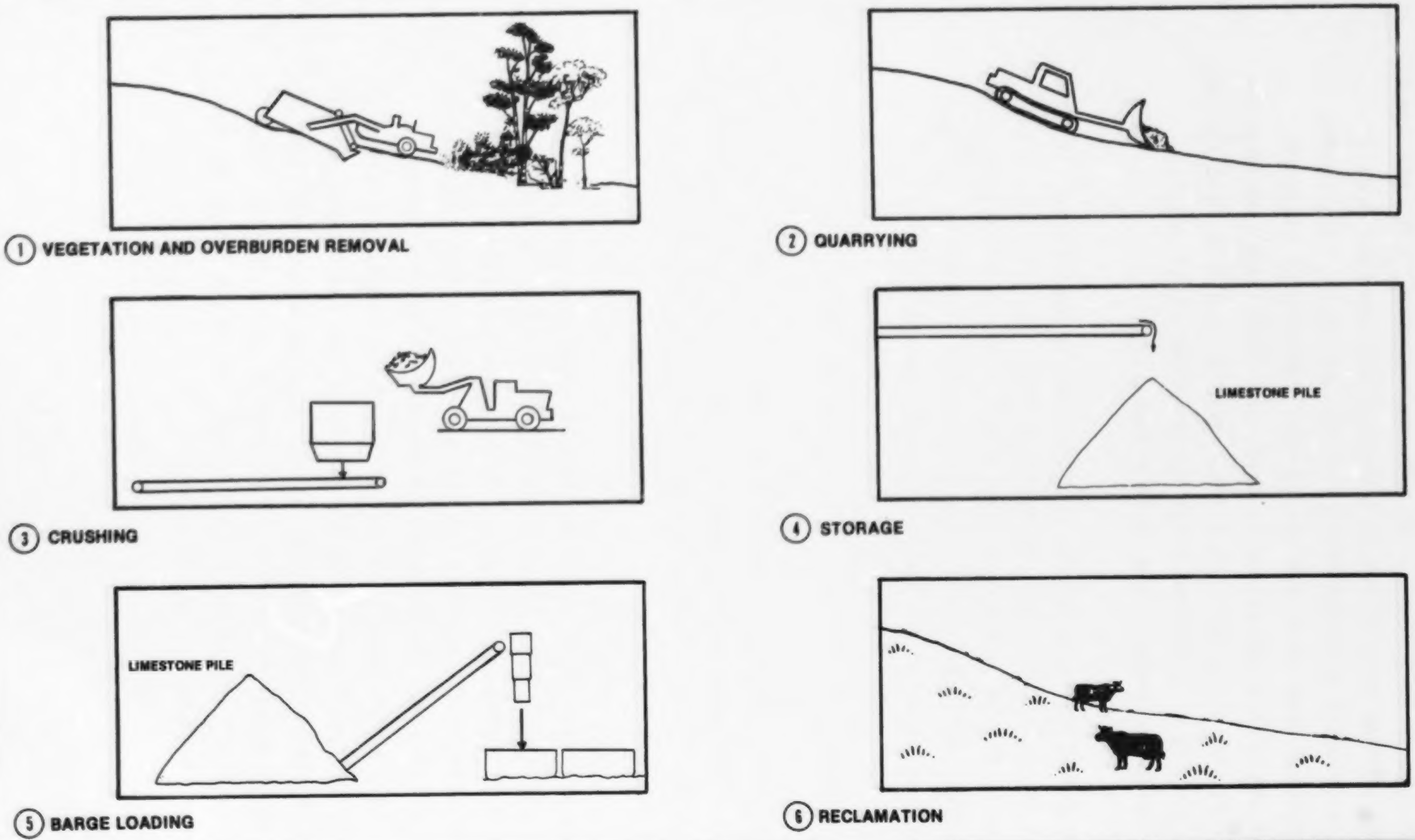
① VEGETATION AND OVERBURDEN REMOVAL
② QUARRYING
③ CRUSHING
④ STORAGE
LIMESTONE PILE
⑤ BARGE LOADING
LIMESTONE PILE
⑥ RECLAMATION

Figure A.35
STEPS OF PROPOSED QUARRY PROCESS

SOURCE: Environmental Science and Engineering, Inc., 1977.

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A southwesterly slope (0.6 percent to 0.8 percent) of the deposits will position the quarry floor more than 30 meters (100 feet) above msl on the northeast portions of the property, and approximately 12 meters (40 feet) above msl at the southern boundary between Ideal Basic Industries and the McWilliams property. Throughout the developed areas, the quarry floor will be about 3 meters (10 feet) above the bottom of the lower Ocala limestone layer.

Ideal Basic Industries plans to have several areas available for excavation. Two active slopes will normally be used to meet the required production levels, with the other slopes on a standby status in case some operational problem prevents work at the primary site.

Where topsoil and/or overburden are present, they will be removed separately from the limestone formation to attempt to maintain their own soil characteristics. This removal will be performed to insure that production will be maintained at the active quarry areas. Ripping equipment mounted on a dozer will loosen the limestone. Because of the need for maximum blending of different limestone deposits, the dozer will rip downward on a 25- to 30-degree slope, or about a 2 to 1 grade. Blasting is not anticipated because the limestone is soft enough to be loosened by ripping. Front-end loaders will then load the material and transport it to a slowly turning breaker mechanism for crushing hard, oversize slabs 1.2-meter (4-foot) input to 0.15-meter (0.5-foot) output. The crushers will be located near the quarry face and will feed the limestone onto a conveyor system for transport to the central storage area. Use of several crushers and conveyors is anticipated to facilitate working simultaneously at least two quarry areas. When the limestone reaches the storage area, it will be either loaded directly onto a barge or placed on the stockpile by a traveling stacker belt.

The long-term operation of the quarry, the high rate of production, and the variable, discontinuous physical features of the limestone may require that up to 120 hectares (300 acres) of land surface be disturbed at any given time. After the initial opening of sufficient active quarry area, the amount of disturbed area can be kept relatively constant and the efficiency of operation maintained by depositing stripped overburden directly on reclaimed areas. This technique will reduce to a minimum the need to store, maintain, or rehandle overburden. It is anticipated that the quarry will operate for approximately five years before any significant area is completely reclaimed. This length of time will be required because of the necessity to maintain at least two operating quarry areas, several active stripping disposal areas, and a network of heavy equipment roads and belt conveyor routes, and because the initial production will come from areas with no overburden.

The planned equipment for the quarry will include approximately:

| | |
|---|---|
| 2-4 | Large dozers with ripper attachments (D-9 or D-10 Class) |
| 4-6 | Front-end loaders (10-12 yard capacity) |
| 2-3 | 36-yard self-loading scrapers |
| 1 | Road grader |
| 2 | Pickup trucks |
| 1 | Tractor and seeder |
| 1 | Water spray truck. |

All equipment will be operated according to Mining Enforcement and Safety Administration (MESA) and Occupational Safety and Health Administration (OSHA) regulations.

It is estimated that a total of 19 people will be employed at the quarry site. General job descriptions and numbers of personnel are as follows:

| | |
|---|---|
| 1 | Supervisor |
| 11 | Equipment operators |
| 3 | Maintenance personnel |
| 4 | Laborers. |

Generally the quantity of overburden material increases as the surface elevations rise from the ravines up to the ridges. The initial quarry operations will follow these slopes around the clarification basins. The second phase of excavation will require significant overburden removal. When there are areas to reclaim, overburden will not be hauled to Milkhouse Branch but will be placed on previously quarried areas.

The topsoil will be stripped and stored in a separate area so that it can be used in the final phase of reclamation. The topsoil removed during the first three to five years of operation will be stockpiled in an area where overburden depths prohibit quarrying. After the topsoil is removed, the overburden will be stripped off the limestone layers. As the first stage of reclamation, this overburden will be hauled by pan scrapers and deposited on previously quarried areas. The deposited material will be compacted to approximately the same density as in its natural state. Placement of the overburden in thin layers will enable the travel of the equipment across the area to provide stable, well-compacted strata. The overburden material will be placed on several different areas at any given time so that previously quarried areas will gradually be brought up to the final grades required for reclamation. Final grades will be limited to a 3 to 1 slope and will be blended to meet existing slopes.

As shown schematically in Figure A.36, a drainage and transportation route from the active quarry area will be maintained through the reclamation zone. This alignment will provide the route for the conveyor system linking the active quarry face with the loading and storage facility at the river. The temporary access roads will parallel the conveyor route to allow access to the work site, and to allow inspection and maintenance of the conveyor system. The major drainage system from the quarry and reclamation areas will be located within this alignment corridor. All of the drainage from these areas will be directed into the nearest natural drainway flowing into the clarification basins. Figure A.37 shows cross sections of a typical active quarry area.

The quarry development will extend into drainage areas adjacent to the natural drainage areas of Clarification Basins No. 1 and No. 2. In some locations, the development will extend upslope and across the drainage

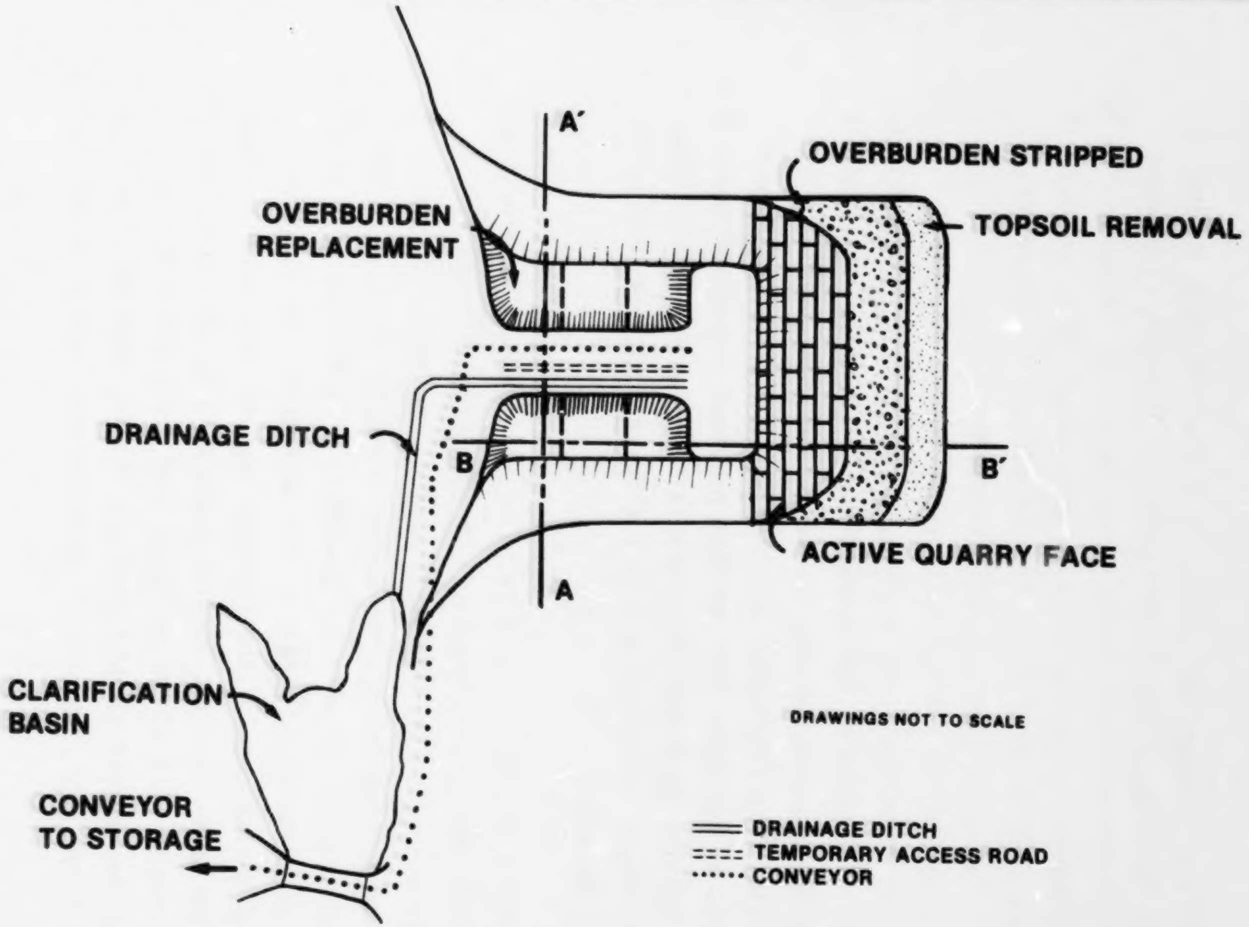
A'
OVERBURDEN STRIPPED
TOPSOIL REMOVAL
OVERBURDEN REPLACEMENT
DRAINAGE DITCH
B
B'
ACTIVE QUARRY FACE
A
CLARIFICATION BASIN
DRAWINGS NOT TO SCALE
CONVEYOR TO STORAGE
DRAINAGE DITCH
TEMPORARY ACCESS ROAD
CONVEYOR

Figure A.36
PLAN OF TYPICAL QUARRY CUT

NOTE: SEE FIGURE A.37 FOR CROSS SECTIONS OF A–A' AND B–B'

SOURCE: Environmental Science and Engineering, Inc., 1977.

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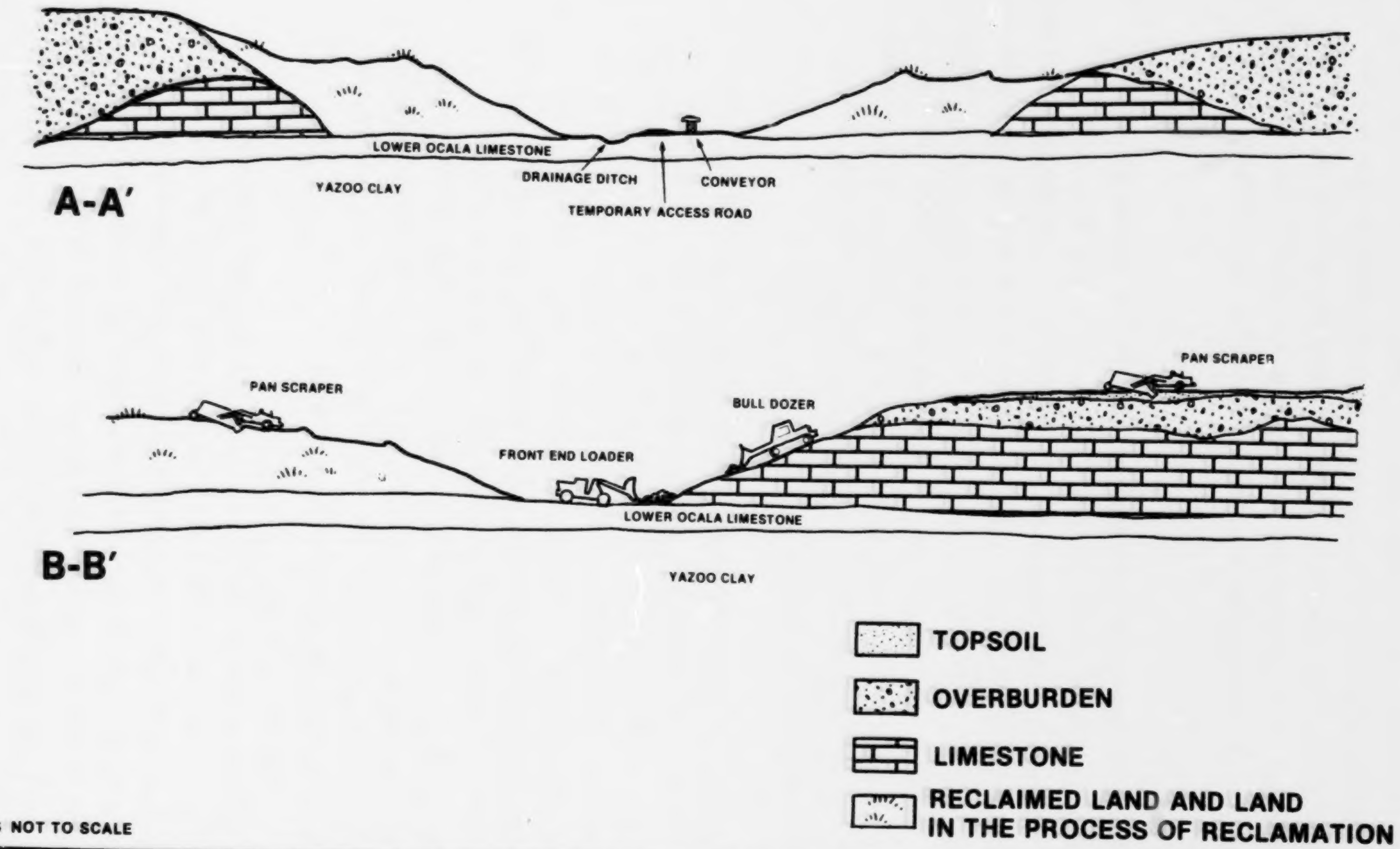
LOWER OCALA LIMESTONE
DRAINAGE DITCH
CONVEYOR
YAZOO CLAY
TEMPORARY ACCESS ROAD
A-A′
PAN SCRAPER
PAN SCRAPER
BULL DOZER
FRONT END LOADER
LOWER OCALA LIMESTONE
B-B′
YAZOO CLAY
TOPSOIL
OVERBURDEN
LIMESTONE
RECLAIMED LAND AND LAND IN THE PROCESS OF RECLAMATION

DRAWINGS NOT TO SCALE

Figure A.37
CROSS SECTIONS OF A TYPICAL QUARRYING AREA

NOTE: SEE FIGURE A.36 FOR LOCATION OF A–A′ AND B–B′

SOURCE: Environmental Science and Engineering, Inc., 1977.

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divides into drainage areas without a clarification basin. The stripping of overburden and quarrying of limestone will reverse the natural drainage pattern so that runoff is directed into the previously disturbed areas. This arrangement will enable all runoff from disturbed areas to be routed through the clarification basins for sediment removal.

The clarification basins will be designed to provide proper retention time to reduce sediment concentrations to the allowable discharge levels. In many areas drainage from the quarry face will require little if any man-made modifications. However, where the quarry is developed south of Basins No. 1 and No. 2, the natural slope of the quarry floor will tend to drain water south rather than north back toward the basins. There will be areas where ditching or pumping will be required to carry the flow back to the north against the natural slope gradient of the lower Ocala limestone formation.

Within the areas to be mined during the first 15 years, the existing drainage patterns are north to Thompson Mill Creek [173 hectares (427 acres)], south to Hollinger Creek [114 hectares (281 acres)], and west via several tributaries [69 hectares (171 acres)] to the Alabama River (see Figure A.38). Once the areas are mined, reclaimed, and revegetated, the drainage patterns will follow the corridors remaining from the conveyor systems into each area. The northern areas (I, II, IV, VII) will drain southwestward to the two permanent clarification basins, and the southern areas (II, V, VI) will be reclaimed to establish several drainage patterns into Hollinger Creek. This drainage pattern is shown schematically in Figure A.39.

Since the slope of quarry floor dominates the drainage patterns, reestablishing natural drainage into Thompson Mill Creek and the Alabama River would be difficult. In order to reverse the slope of the drainage/conveyor corridors, additional layers of overburden would have to be placed after an area has been mined. However, since the surface elevation will be lowered approximately 8 to 15 meters (25 to 50 feet)

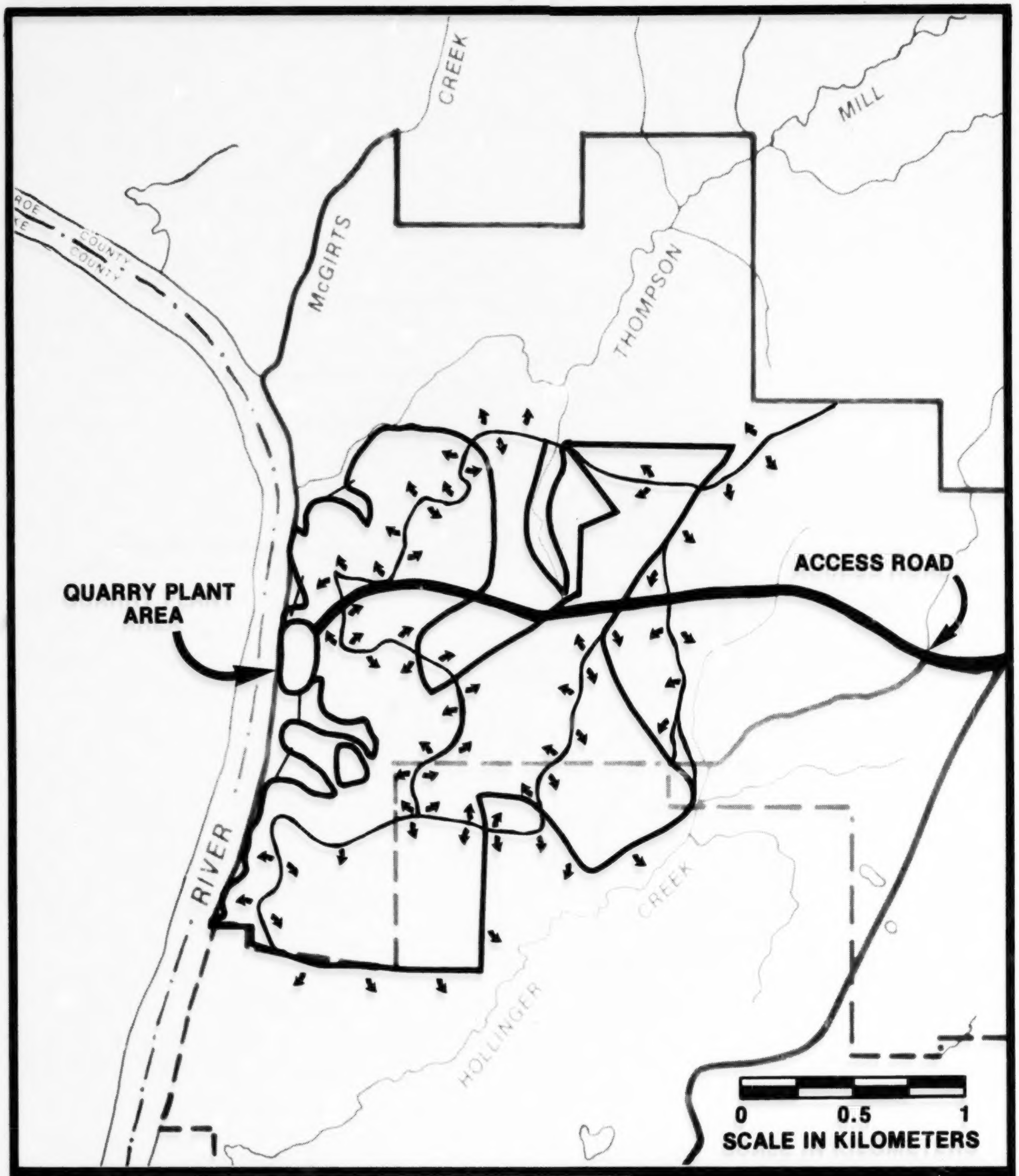
CREEK
MILL
McGIRTS
THOMPSON
COUNTY
COUNTY
ACCESS ROAD
QUARRY PLANT AREA
RIVER
CREEK
HOLLINGER
0
0.5
1
SCALE IN KILOMETERS

Figure A.38
EXISTING DRAINAGE PATTERNS IN QUARRY AREAS

SOURCE: Environmental Science and Engineering, Inc., 1977.

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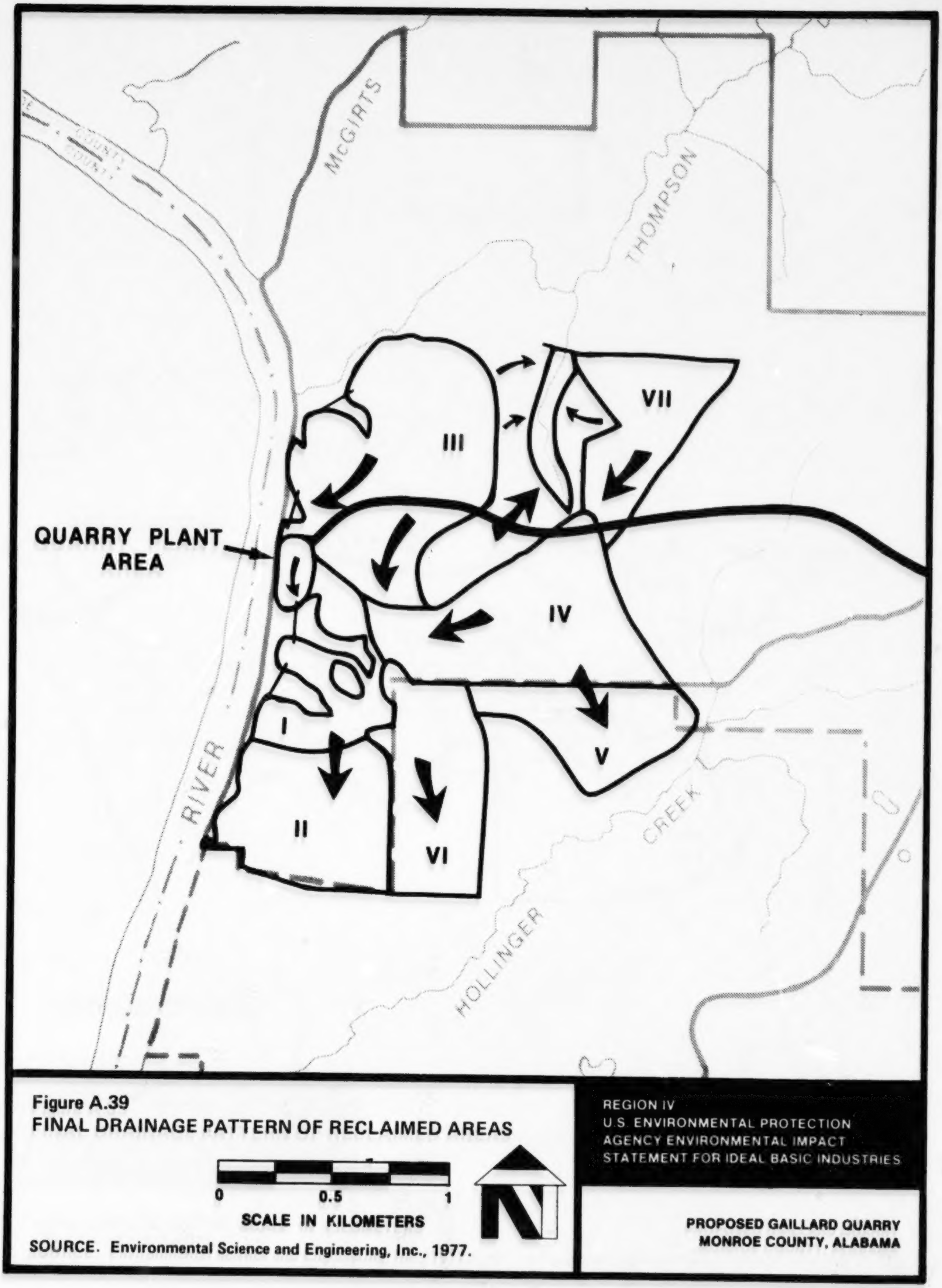
McGIRTS
THOMPSON
COUNTY
COUNTY
QUARRY PLANT AREA
I
II
III
IV
V
VI
VII
RIVER
CREEK
HOLLINGER

Figure A.39
FINAL DRAINAGE PATTERN OF RECLAIMED AREAS

0
0.5
1
SCALE IN KILOMETERS
N

SOURCE. Environmental Science and Engineering, Inc., 1977.

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throughout the reclaimed areas, reversing the drainage would require massive amounts of soil to bring the surface back up to baseline elevations. While this would not be practical in most cases, each mined area will be assessed for the possibility of re-establishing drainage or a portion of the drainage back into the baseline watershed.

The final surface elevations will form a gently rolling terrain suitable for cattle grazing. Slopes will be blended with nonquarried areas to minimize an erosion problem. The revegetation of a reclaimed area will be done as soon as practical with consideration to the soil fertilization requirements, growing season of desired types of grasses, and seasonal weather conditions.

## ENVIRONMENTAL CONSIDERATIONS

## RESOURCES REQUIRED

The operation of the Gaillard quarry will require the resources shown in Figure A.40, "Daily Resources Cycle."

Approximately 14 hectares (35 acres) of pastureland will be quarried each year to produce approximately 2.4 million metric tons (2.7 million tons) of limestone (wet basis). Simultaneously, with the removal of limestone, the depleted area of the quarry will be reclaimed to pastureland, as described in the operations section of this appendix.

### Labor

The quarry facility will have 19 workers and will generate about $400,000 per year in salaries.

### Electricity

The operation of the conveying and crushing equipment and other equipment will use 3.0 megawatts of electricity. The plant will have 4.18 kilovolt service supplied from the Alabama Electric Cooperative or the Alabama Power Company. Transmission lines and a transformer substation on-site will be required. An aboveground transmission system located within the access roadway corridor is planned.

### Water Supply

In order to supply the potable water for sanitary facilities, a deep well will be drilled to deliver 1.8 cubic meters (475 gallons) per day.

### Water Transportation

The quarried limestone will be transported to the Theodore cement plant at the rate of 7,788 metric tons (8,585 tons) per day. Sixteen barges

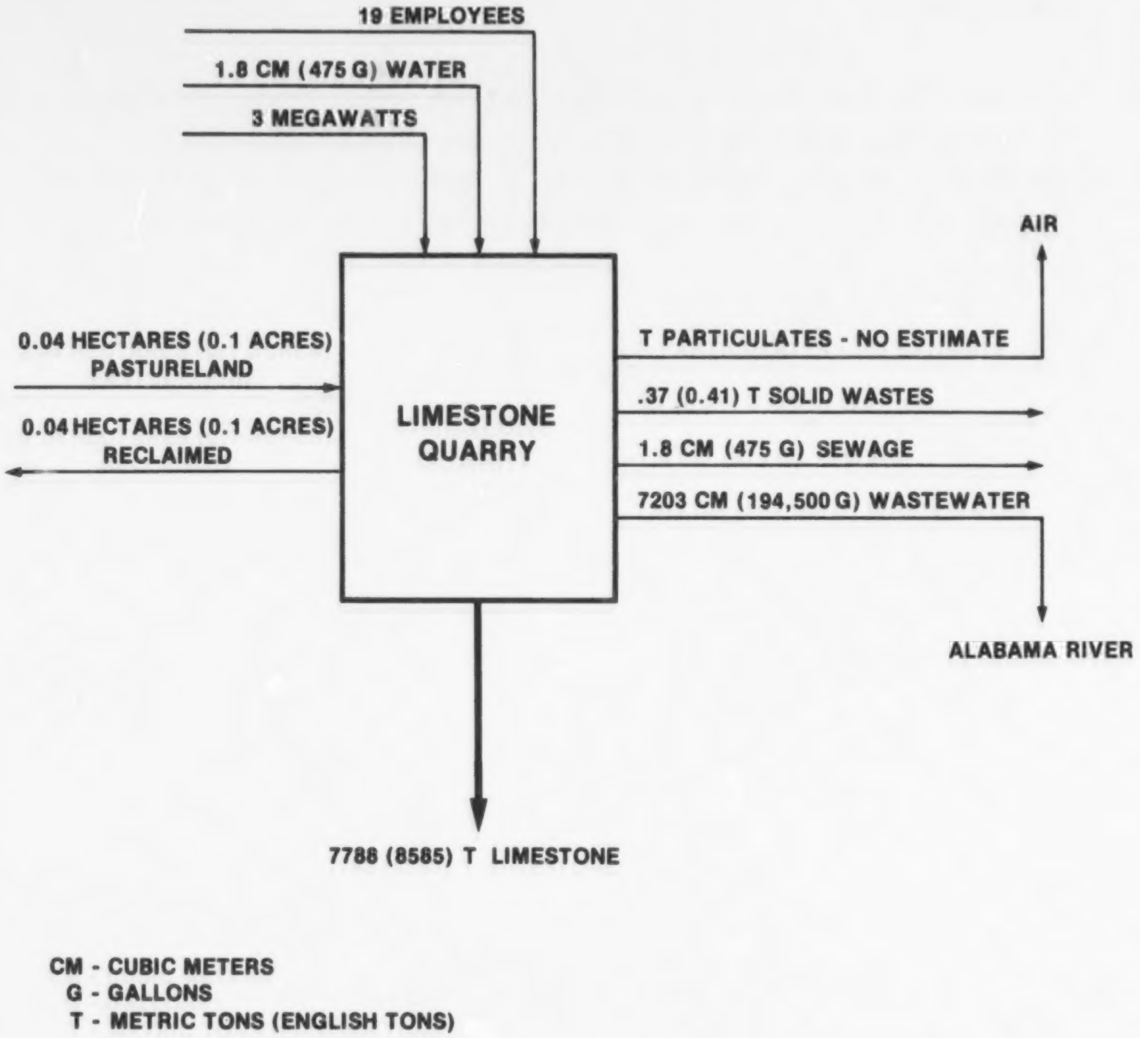
19 EMPLOYEES
1.8 CM (475 G) WATER
3 MEGAWATTS
AIR
0.04 HECTARES (0.1 ACRES) PASTURELAND
T PARTICULATES - NO ESTIMATE
.37 (0.41) T SOLID WASTES
LIMESTONE QUARRY
0.04 HECTARES (0.1 ACRES) RECLAIMED
1.8 CM (475 G) SEWAGE
7203 CM (194,500 G) WASTEWATER
ALABAMA RIVER
7788 (8585) T LIMESTONE
CM - CUBIC METERS
G - GALLONS
T - METRIC TONS (ENGLISH TONS)

**Figure A.40**
DAILY RESOURCES CYCLE (QUARRY SITE)

SOURCE: Environmental Science and Engineering, Inc., 1977.

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and three tow boats will be utilized with a daily schedule of four barges being loaded, four barges en route to Theodore, four barges being unloaded at Theodore, and four barges returning to the quarry site. Every 20.5 hours a new set of four barges will leave the quarry facilities.

The facility outputs shown in Figure A.40 are environmental discharges and conversion products of the resources used as production input. These daily outputs, which are typically based on annual outputs divided by 365 days per year, are described in the following sections.

## AIR POLLUTANT EMISSIONS

### Construction and Operation

The construction and operation activities are generally similar in emission characteristics, in that they both could generate fugitive dust. During construction, land clearing and grading could produce small quantities of fugitive dust, especially during dry periods. During operations the activities within the quarry area could cause similar emissions.

The natural moisture content of the limestone is high (22 percent) and will tend to reduce the potential for dust emissions from these heavy equipment activities. In addition, it is planned to use a water tank truck to wet active areas and haul roads to the extent needed (during dry periods). Because of slopes and terrain, this method of wetting is not practical for all of the areas being worked.

Other potential dust emissions are related to the operation of rock breakers, conveyors, stockpiles, and barge loaders. Water sprays will be used as needed in these areas to reduce fugitive dust generation. Again, the inherent moisture content of the limestone should lessen these potential emissions. The barge-loading conveyor will use a telescoping boot to minimize dust.

The emission rates of fugitive dust have not been quantified due to a lack of data for similar operations. However, because of the measures previously mentioned, dust emissions are not projected to affect ambient air quality significantly beyond the boundaries of the property, and on-site air quality should be well below the AAQS standards (see Air Quality section of Appendix C, Impacts).

## NOISE

### Construction

Noise will be generated from construction activities of land clearing and grading, pile driving, construction of buildings, and erection of equipment (refer to Table A.14 for a listing of equipment to be used).

Figure A.41 shows the estimated noise levels that could be generated from these activities. Nearby residences will not be impacted by the noise; the equipment used will have noise suppression devices that will reduce noise levels for workers on-site.

### Operations

The expected noise levels from the operation of the quarry's facilities are expected to be related to the heavy equipment used in the active quarrying areas. Due to the planned mobility of these operations, noise levels are difficult to show graphically as was done for the construction activities.

It has been estimated that quarrying activities could generate sound levels equal to or greater than 55 dBA within a 1-kilometer (0.6-mile) radius.

Noise levels are shown in Figure A.42; these levels are not expected to impact nearby residences. On-site impacts will be lessened by use of equipment that meets the Occupational Safety and Health Administration's requirements.

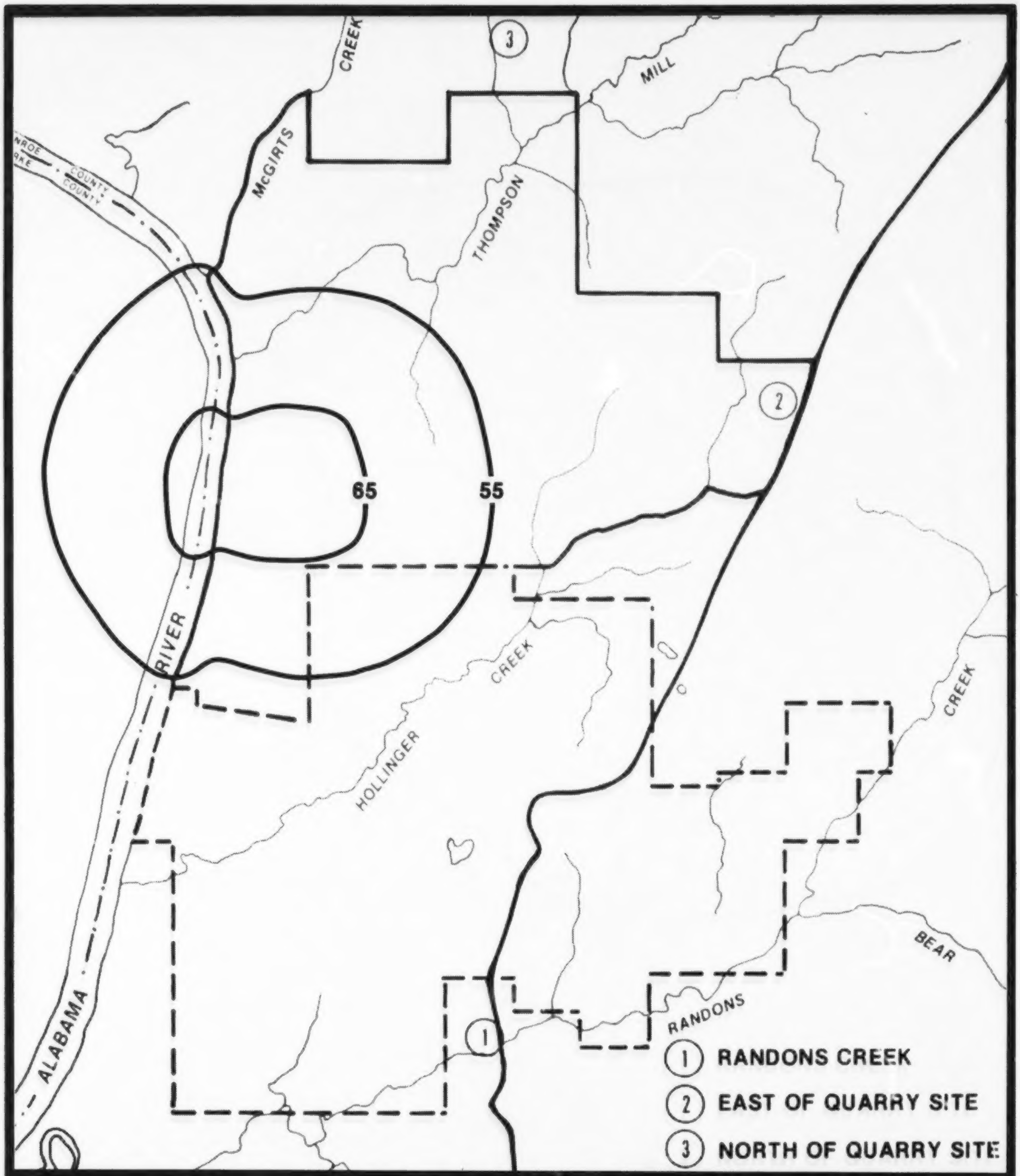
CREEK
③
MILL
McGIRTS
THOMPSON
MONROE COUNTY
CLARKE COUNTY
65
55
②
RIVER
CREEK
HOLLINGER
CREEK
ALABAMA
BEAR
RANDONS
①
① RANDONS CREEK
② EAST OF QUARRY SITE
③ NORTH OF QUARRY SITE

**Figure A.41**
EQUAL SOUND LEVEL ($L_{dn}$) CONTOURS SURROUNDING THE QUARRY SITE DURING CONSTRUCTION ACTIVITIES

0 0.5 1
**SCALE IN KILOMETERS**

SOURCE: Environmental Science and Engineering, Inc., 1977.

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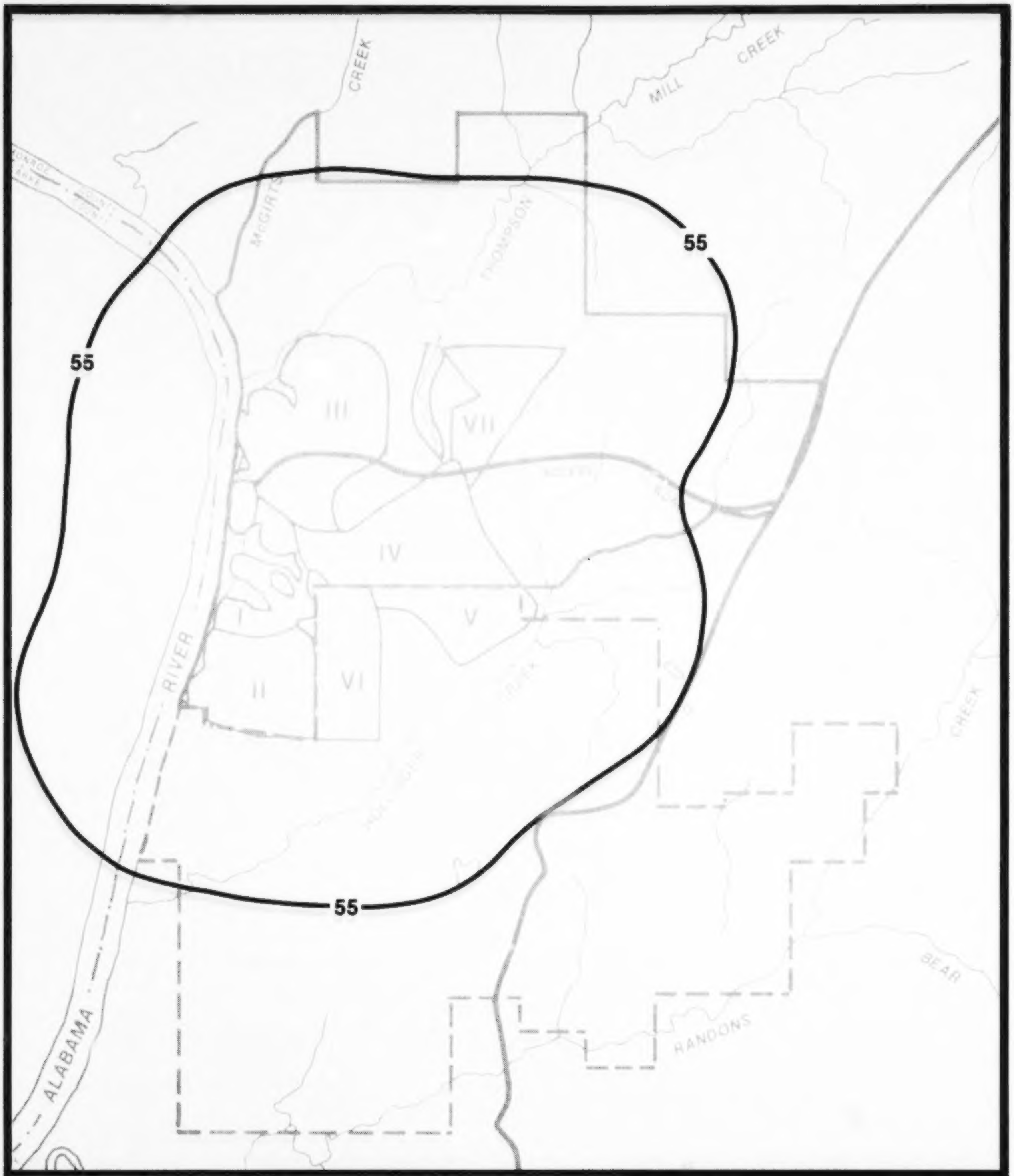
CREEK
MILL CREEK
MONROE CLARKE COUNTY COUNTY
McGIRTS
THOMPSON
55
55
55
55
III
VII
IV
V
I
II
VI
RIVER
CREEK
BEAR
RANDONS
ALABAMA
0 0.5 1
SCALE IN KILOMETERS

Figure A.42
ESTIMATED BOUNDARY OF SOUND LEVEL, $L_{dn}$ of 55 DECIBELS, SURROUNDING THE QUARRY SITE DURING OPERATION

SOURCE: Environmental Science and Engineering, Inc., 1977.

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## SOLID WASTES

### Construction

The construction of the quarry facilities will generate wastes from land clearing, dredging, grading, and construction.

The ground clearing wastes will include any trees and brush remaining from current timber operations and conversion to pasturelands.

The two viable methods of disposal are chipping for mulch and burning. (Hauling to the Monroe County Landfill is not considered practical due to quarry access problems at the time of the construction schedule and due to the potential quantities and hauling distance.)

Chipping of the smaller-sized trees and brush will be performed on-site, and the product used for mulch to assist with erosion protection and revegetation of fringe areas.

The burning technique will be the same as that used at the plant site--an air blower type pit burner. While not expected to be needed due to the remoteness of the site, this method will produce less smoke than regular open burning. The contractor will apply to the Alabama Air Pollution Control Commission for the appropriate permit. Burning will be continuously supervised and controlled for fire prevention. Burning will be conducted only under favorable meteorological conditions to insure adequate dispersion of the smoke generated.

Dredging is not expected to be required for constructing the docking facility. The overburden removed for site grading will be stored for reclamation purposes later in the project. Any overburden remaining will be stockpiled in the areas designated for non-quarrying, whereas the limestone will be stockpiled for use in the startup of crushing operations.

The construction debris from the erection of the structures and buildings--lumber, concrete, paper wastes, and metal scraps--will be transported to the Monroe County Landfill for burial.

Operations

The solid wastes generated from the quarry operations will be approximately 137 metric tons (151 tons) per year. These wastes do not include trees and overburden removed since, for the most part, the vegetative cover of the lands will have been removed, and the soil overburden stored for reclamation use. Prior to quarrying, the area essentially will be changed to pastureland by a local rancher (Mr. McWilliams).

The quarry will have an office with two employees who will generate various paper and cardboard wastes of about 4.5 kilograms (10 pounds) per day. In addition, 19 employees will generate roughly 2.3 kilograms (5 pounds) of lunchroom wastes each day. Therefore, a total wasteload of 6.8 kilograms (15 pounds) per day is expected.

The quarry will have a shop for the maintenance of bulldozers, scrapers, trucks, breakers, and conveyors. The daily waste load from this area is projected to be 4.5 kilograms (10 pounds) of oily rags, grease and oil, oil containers, cardboard and wood, and metal scraps. Waste oils and large metal scraps will be recycled through appropriate vendors.

Present quarry plans show the use of three settling basins over the first 15 years of operation. The solids that settle in these basins must be removed as needed to maintain depths and capacities. These solids will amount to about 360 kilograms (800 pounds) per day and will be used in the reclamation of quarried lands.

Table A.15 summarizes the expected solid wastes that will be taken to the Monroe County Landfill and that will be used in reclamation.

Table A.15. Solid Waste Disposal

| Area | Type | Quantity | | | | Disposal Method |
|---|---|---|---|---|---|---|
| | | Metric Tons/Year* | (Tons/Year)* | Kilograms/ Day | (Pounds/Day) | |
| Office | Papers, lunchroom trash | 2.5 | (2.7) | 6.8 | (15) | Off-site landfill |
| Maintenance | Oily rags, oil, grease, metal scraps, cardboard, wood | 1.7 | (1.8) | 4.5 | (10) | Off-site landfill |
| Settling Basin | Sediment | 132.4 | (146.0) | 362.8 | (800) | Reclamation |
| TOTAL | | 136.6 | (150.5) | 374.1 | (825) | |

*365 days/year.

Source: Powledge, 1977.

## WATER UTILIZATION AND DISPOSAL

### Water Requirement

The potable water requirements for the 19 employees at the facility will be supplied by an on-site well [1.8 cubic meters per day (475 gpd)]. The well is expected to be about 76 meters (250 feet) deep, which will be below the Yazoo clay layer. Because of the low quantities to be withdrawn, problems caused by aquifer drawdown are not expected.

The fugitive dust suppression equipment (tank truck and various water sprays) will be supplied with water from the clarification basins.

### Wastewater

#### Construction and Operation

At the beginning of the construction phase, Clarification Basins No. 1 and No. 2 will be built to control sediment inputs to the Alabama River. During quarry operations these basins will collect and reduce the solids content of stormwater runoff from the quarry areas, stockpiles, and unvegetated areas being reclaimed.

Control of surface runoff is required by the U.S. EPA and the Alabama Water Improvement Commission (AWIC). The agencies' requirements, which vary regarding specific controls, are the following:

1. U.S. EPA (40 CFR 436-Subpart B-Crushed Stone) requires that mine dewatering must meet the proposed New Source Performance Standards for total suspended solids (TSS) of 30 mg/l (1 day maximum) and pH of 6.0 to 9.0 or have a capacity to store the runoff from a 10-year, 24-hour storm.
2. AWIC (Proposed Revisions to Surface Mining Regulations) requires that drainage from all storage, mining, and reclaimed areas must meet limitations of TSS of 90 mg/l (1 day maximum) and 30 mg/l (30 day average), and a pH of 6.0 to 9.0. During overflow from a ten-year storm, the TSS must be $\leq$ 1000 mg/l.

> Clarification basins should be designed for a capacity of 762 cubic meters per hectare (0.25 acre-feet per acre) of disturbed area.

The overall drainage control will allow for less than 30 mg/l TSS in the clarification basin effluent and for a storage capacity (above average water level) for a 10-year, 24-hour storm. Based on a settleability test performed on the natural soils and limestone found at the site, the TSS standard should be met by a detention time of at least 24 hours.

Table A.16 presents the storage capacities of the five clarification basins and the areas of land to be quarried. Based on these figures, Basins No. 1 and No. 2 have a combined storage capacity of 237,000 cubic meters (192 acre-feet). This capacity is equivalent to the runoff from approximately 263 hectares (650 acres) during a 10-year, 24-hour storm.

The present plan allows for approximately 120 hectares (300 acres) of mining activity at any one time and for about 14 hectares (35 acres) to be exhausted and reclaimed per year. Therefore, allowing for areas that are reclaimed and vegetated, and no longer drain to the basins, there is sufficient capacity for at least the first 15 years of operation. It is planned that, whenever possible, an area that has been reclaimed and has well-established vegetation will be drained to bypass the clarification basins to allow for additional drainage capacity.

Based on an average annual rainfall of 1,397 millimeters (55 inches), the average daily flow to these two basins from 263 hectares (650 acres) is 4,760 cubic meters (3.9 acre-feet) per day and the effective average detention time should be about 50 days.

The overburden storage area, Milkhouse Branch, is calculated to have a runoff of about 122,000 cubic meters (98.7 acre-feet) in the design storm, whereas its proposed basin will have a storage capacity of 176,000 cubic meters (143 acre-feet). Thus, the basin appears more than adequate to store the worst case runoff. Actually, as mining areas III,

Table A.16. Proposed Storage Capacities of Storage Basins and Area of Quarry Areas

| Clarification Basin | Storage Capacity Cubic Meters | Storage Capacity (Acre-Ft) |
|---|---|---|
| No. 1 | 181,000 | (147) |
| No. 2 | 56,000 | ( 45) |
| No. 3 | 11,000 | ( 9) |
| No. 4 | 53,000 | ( 43) |
| No. 5 | 176,000 | (143) |

| Quarry Areas | Area Hectares | Area (Acres) |
|---|---|---|
| I | 27 | ( 67) |
| II | 40 | (100) |
| III | 72 | (179) |
| IV | 55 | (136) |
| V | 27 | ( 67) |
| VI | 37 | ( 92) |
| VII | 30 | ( 73) |
| TOTAL | 288 | (714) |
| Milkhouse Branch | 142 | (351) |

Source: Environmental Science and Engineering, Inc., 1977.

IV, V, VI, and VII are developed, the potential runoff will decrease substantially since these mining areas will drain more than half of Milkhouse Branch's natural drainage area into the other clarification basins. The average daily flow for the Milkhouse Branch drainage of 142 hectares (351 acres) should be about 2,440 cubic meters (2 acre-feet) per day, with an effective detention time of 72 days.

The basins will have an intermittent discharge to provide these storm capacities. In addition, sediment must be removed periodically to maintain capacities.

Erosion control practices of contour terracing and berming the developed areas and their slopes will lessen the potential sediment loading of the runoff. The problem of erosion and stormwater runoff is basically one of controlling water velocities. The use of contour terracing in the placement of overburden and at blend points will slow down the runoff. Slopes will be limited to a maximum of 3 to 1, which in addition to the contour terracing, should lessen the erosion potential from unvegetated soils. The edge of each terrace will rise slightly or be bermed to allow ponding of water and will be sloped for drainage perpendicular to the face.

Additional erosion protection will be obtained by seeding the long-term overburden storage piles and reclaimed areas. Grassy vegetation will be effective for retaining soils and will be compatible with the intended use of the reclaimed areas for pasture.

Limestone quarrying and reclamation will produce at least an 8-meter (25-foot) drop in average land elevations. This terrain change will alter somewhat the natural watersheds in the area. Approximately 13 percent of the Hollinger drainage area and 10 percent of the Thompson Mill drainage area will be modified by the projected mining activities. Therefore, whenever practical, the reclaimed drainage patterns will re-establish or simulate natural drainage to maintain base flows in the creeks. It is expected that the Hollinger Creek watershed can retain at least an equivalent area. However, the Thompson Mill Creek watershed area will decrease because the quarry floor slopes away from the creek.

## Sanitary Wastes

During construction the only sanitary facilities available will be portable toilets. A septic tank and soil absorption system will be constructed to serve as permanent sanitary facilities. The wasteload during operations is expected to be about 1.8 cubic meters per day (475 gpd).

## ENVIRONMENTAL SAFEGUARDS

The design of the proposed quarry has been modified to mitigate potential environmental impacts. These actions have been described in the preceding sections and are summarized below.

### Stormwater Runoff Control

During construction the two main clarification basins will be built quickly in order to treat the runoff from the disturbed area and to mitigate the sediment loadings to the Alabama River.

These same basins (Nos. 1 and 2) will have the capacity to maintain the runoff from a 10-year, 24-hour storm from the quarry areas. Also, Basin No. 5 will meet the same requirements for runoff from the overburden storage area in Milkhouse Branch. All the basins should have levels of suspended solids in the discharge well below the 30 mg/l level required by EPA.

### Erosion Controls

Erosion will be reduced by use of contour terracing, berms, and ditches in appropriate areas. Also, reclaimed areas and long-term overburden storage will be vegetated for better soil retention.

### Fugitive Dust Controls

Roadways and quarrying areas will be wetted as needed by a water tank truck to control dust emission. Other process areas will use water sprays to suppress dust emissions.

### Noise Controls

Construction and operation equipment will meet or exceed the applicable MESA requirements. Noise levels from quarrying activities will be attenuated by vegetation and terrain effects and by the distance of residences from the quarry area.

## Burning Controls

Burning of vegetation wastes (trees and brush) will be conducted only during periods of favorable dispersion conditions and will be continuously supervised. In addition, the air-blower type pit burner will reduce potential smoke emissions more than normal "open burning" techniques.

## Solid Wastes

The wastes from construction (except for vegetation wastes, which will be chipped or burned) and from operations will be taken to the Monroe County Landfill for proper disposal.

## Preservation of Natural Communities

The existing ecological communities in woodland areas not converted to pasture generally will not be disturbed by the quarry activities. Reclamation activities will create blend areas between reclaimed and existing lands.

## Archaeological/Historical Measures

Ideal Basic Industries authorized a salvage operation on a site (No. 6) that was identified as having potential archaeological/historical significance, and the salvage operation was conducted in October, 1977. The archaeologist's final report was submitted in March, 1978, and the approval of the Alabama Historical Commission is pending.

If another archaeological or historical site is uncovered during construction or operations, the Alabama Historical Commission will be notified immediately. Work will stop in that specific area until the Commission gives its approval to resume operations.

## PERMITS AND APPROVALS REQUIRED

The environmental permits and approval requirements for the construction and operation of the quarry facility are presented in Table A.17.

The various emission or effluent requirements of these agencies are presented within the applicable sections of this appendix (Air and Water).

Table A.17. Environmental Permits and Approval Requirements

| Parameter | Agency | Requirements |
|---|---|---|
| Air Emissions | Alabama Air Pollution Control Commission | Permit for construction and permit for operation of crusher and conveyor systems. Permit for open burning. |
| Solid Waste | Monroe County Health Department | No permit required but must approve of type of waste to be disposed in landfill. |
| | Alabama Health Department | No permit required but approval of landfill for specific wastes; works through Monroe County Health Department. |
| | U.S. Environmental Protection Agency | No permit required; requirements under Resource Conservation and Recovery Act of 1976; works through state agency. |
| Wastewater Discharges | Alabama Water Improvement Commission | Surface mining permit required before operation. Certify Corps permit applications. |
| | U.S. Environmental Protection Agency | NPDES permit required. |
| | U.S. Army Corps of Engineers | Permits required for construction of discharge structures. Fill permit may be required for construction of dams by filling operations. |

Table A.17. Environmental Permits and Approval Requirements (Continued, page 2 of 2)

| Parameter | Agency | Requirements |
|---|---|---|
| Sanitary Waste | Monroe County Health Department | Occupancy permit for planned sanitation facilities; construction permit for septic tank and soil absorption system. |
| Potable Water Supply | Alabama Health Department | Certification of potable water supply; works through Monroe County Health Department. |
| | Monroe County Health Department | Certification of potable water supply. |
| | Water Well Standards Board | Requires Engineering Report of water system. |
| Docking Facility | U.S. Army Corps of Engineers | Permit for construction of docking facility. |
| | Alabama Water Improvement Commission | Certification of applications to Corps. |
| Access Roadway and Bridge | U.S. Coast Guard | Permission to bridge Coleman's Branch and other navigable streams may be required.* |

* If the U.S. Coast Guard is determined to have jurisdiction.

Source: Environmental Science and Engineering, Inc., 1977.